

STUDIES IN ALYSSUM: NEAR EASTERN REPRESENTATIVES
AND THEIR ALLIES, I

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IN THE COURSE OF A monographic study * of the genus *Alyssum* L., a number of previously undescribed taxa from Turkey were discovered. In this paper these are described, and new combinations, also resulting from the study, are made. In addition, the new species are assigned to the appropriate section, subsection, or series, several of which are new to the nomenclatural hierarchy of *Alyssum*. In an earlier paper (Dudley, 1962), a few new taxa from the Near East with extra-Turkish distributions were described and discussed. The corpus of the taxonomic treatise, to be published at a later date, will take into consideration generic limits within the Cruciferae, tribe Alysseae, provide keys for identification of species of *Alyssum*, and consider the systematics of the Near Eastern species and their allies.

The place names given in the most recent atlas of Turkey (Büyük Atlas, Duran: Istanbul, 1962) are utilized whenever necessary and possible. Occasionally, the names of the Roman Provinces in Anatolia have been used; a paper by Davis (1953) elucidates the boundaries of these provinces in relation to the current Provinces or Vilâyetes. The phytogeographical areas in Turkey are exceedingly complex, and, for the most part, the terminology applied to them has been avoided; however, when used, the terms "Irano-Turanian," "Mediterranean," and "Euxine" are applied in the sense of Davis (1951).

The method of arranging specimen citations according to convenient grid squares (for Turkey) is based on an arbitrary division of land areas enclosed by 2° latitude and 2° longitude. For example, as seen on the map, TEXT-FIG. 1, the land mass enclosed between 40°–42° latitude and 28°–26° longitude is given the grid epithet of A1. Unless otherwise stated, all specimens cited have been examined. The collections made by the author in 1962 are numbered in the sequence of the Davis Anatolian collections, i.e., *Dudley* (*D.* 25680) was collected by the author but numbered as a part of the Davis material. Exclamation points (!) are inserted directly following the synonym citations if the types or isotypes of these synonyms (or in the case of generic synonyms, the type material of the type species) have been seen. No exclamation point is appended if the type material of synonyms has not been seen, though such names are included only when there is no doubt regarding their identity.

The taxa described here as new are predominantly from the very

* In partial fulfillment of the requirements for the degree of Doctor of Philosophy at the University of Edinburgh.

extensive Near Eastern collections made within the past twenty years by Dr. P. H. Davis and his co-collectors, and Dr. A. Huber-Morath. With the exception of *Alyssum corningii*, *A. harputicum*, *A. davisianum*, and *A. huber-morathii*, the other new species were brought to my attention by Dr. Huber-Morath, who recognized them among his own Anatolian collections as being undescribed. I am extremely grateful to Dr. Huber-Morath for putting his entire collection of *Alyssum* at my disposal, for his collaboration, and for his kind permission to publish the six new species which he discovered and for which he suggested the specific epithets. Without the cooperation of the directors of numerous herbaria, clarification of the taxonomic confusion within the genus *Alyssum* or definitive typification of taxa could not have been attempted. From the following herbaria approximately 1,500 specimens, including many types, were borrowed. In addition to the specimens which were received on loan, the author studied approximately 6,000 specimens in those herbaria that are preceded by an asterisk (*).

- * Arnold Arboretum, Harvard University, Cambridge, Massachusetts, U.S.A. (A).
- * Ankara Üniversitesi Fen Fakültesi Botanik Enstitüsü, Ankara, Turkey (ANK).
Universitetets Botaniske Museum, Bergen, Norway (BG).
- * British Museum (Natural History), London, England (BM) (including the Clifford herbarium).
Slovenské Múzeum, Bratislava, Czechoslovakia (BRA).
- * Royal Botanic Garden, Edinburgh, Scotland (E).
- * Conservatoire et Jardin Botaniques, Genève, Switzerland (G) (Delessert herbarium, Barbey-Boissier herbarium, Edmund Boissier herbarium, B.V.D. Post herbarium, and the De Candolle herbarium).
- * Gray Herbarium, Harvard University, Cambridge, Massachusetts, U.S.A. (GH).
- * Private collection of Dr. A. Huber-Morath, Basel, Switzerland (HM).
Department of Botany, Hebrew University, Jerusalem, Israel (HUJ).
- * Farmakobotanik ve Genetik Enstitüsü, Fen Fakültesi, Istanbul, Turkey (ISTF).
Institut für Spezielle Botanik und Herbarium Haussknecht, Jena, Germany (JE).
- * Herbarium, Royal Botanic Gardens, Kew, England (K).
Botanical Institute of the Academy of Sciences of the Ukrainian S.S.R., Kiev, Russia (KW).
Rijksherbarium, Leiden, Netherlands (L).
Komarov Botanical Institute of the Academy of Sciences of the U.S.S.R., Leningrad, Russia (LE).
Hartley Botanical Laboratories, Liverpool, England (LIVU).
- * The Linnean Society, London, England (LINN).
Instituto "Antonio José Cavanilles," Madrid, Spain (MA).
- * The Fielding and Druce Herbarium, Department of Botany, Oxford, England (OXF).
Muséum National d'Histoire Naturelle, Paris, France (P).
Botanical Department of the National Museum, Praha, Czechoslovakia (PR).
Botanische Abteilung der Württembergischen Naturaliensammlung, Stuttgart, Germany (STU) (Anatolian collection of Kühne).
- * Naturhistorisches Museum, Wien, Austria (W) (the General herbarium, the private collection of K. H. Rechinger, and the Hálácsy herbarium).



TEXT-FIG. 1. Map of Turkey, showing grid system used in citation of specimens. For explanation see text.

Botanisches Institut und Botanischer Garten der Universität, Wien, Austria (WU).

Botanischer Garten und Museum der Universität, Zurich, Switzerland (z) (Anatolian collections of Markgraf).

Special thanks are extended to Dr. J. E. Dandy, of the British Museum (Natural History), London; to Professor M. Geiger-Huber, of the Botanisches Institut der Universität, Basel; and to Mr. B. L. Burtt, of the Royal Botanic Garden, Edinburgh, for their assistance regarding the typification of the binomial *Alyssum minus* and the dropping from usage of "*Alyssum campestre*." Acknowledgment is due Mrs. E. C. Dudley, Miss J. Kroll, and Miss R. Smith for their excellent execution of the figure and plates incorporated in this paper. Thanks are due Miss Morag MacKenzie, for preparation of the original manuscript; Mrs. T. P. Walsh, for preparation of the present one; and Dr. Bernice G. Schubert, for her time, patience, and many helpful editorial suggestions.

The author gives sincere recognition to Dr. A. Huber-Morath, Basel, and to Dr. J. Cullen, University Department of Botany, Edinburgh, for their useful suggestions and criticisms. For his careful and constant attention and advice during the preparation of this manuscript, the author is indebted to his supervisor, Dr. P. H. Davis, University Department of Botany, Edinburgh.

Alyssum Linnaeus, Sp. Pl. 2: 650. 1753; Gen. Pl. ed. 5. 293. 1754.

LECTOTYPE SPECIES: *Alyssum montanum* L. (!) (See Britton & Brown, Ill. Fl. North. U.S. ed. 2. 2: 154. 1913; Hitchcock & Green, 1929).

Meniocus Desv. Jour. Bot. Appl. 3: 173. 1814. TYPE SPECIES: *Alyssum linifolium* Steph. ex Willd. (!).

Ptilotrichum Meyer in Ledebour, Fl. Alt. 3: 50. 1831. TYPE SPECIES: *Alyssum canescens* DC. Syst. Nat. 2: 322. 1821 (!). Lectotype, Russia. In rupestribus montosis Siberiae, Mt. Altai, 1819, Fischer s.n. (G-Herb. DC., as *A. sibiricum*).

Psilonema Meyer, *ibid.* LECTOTYPE SPECIES: *Alyssum dasycarpum* Steph. ex Willd. Linn. Sp. Pl. ed. 4. 3(1): 469. 1800 (!). Holotype, Russia. In Sibiria ad Kamam et Volgam fluvium, Stephan (LE, non vidi); isotypes (BM, G, K).

Odontarrhena Meyer, *ibid.* 58. LECTOTYPE SPECIES: *Alyssum tortuosum* Willd. (!).

Gamosepalum Hausskn. Mitt. Thür. Bot. Ver. 11: 73. 1897. LECTOTYPE SPECIES: *Gamosepalum lepidoto-stellatum* Hausskn. & Bornm. ex Hausskn. (!).

Triplopetalum Nyárády, Magyar Bot. Lap. 24: 97. 1925. TYPE SPECIES: *Triplopetalum pinifolium* Nyár. (!).

Section **Meniocus** (Desv.) Hook. in Benth. & Hook. Gen. Pl. 1: 74. 1862. TYPE SPECIES: *Alyssum linifolium* Steph. ex Willd. Linn. Sp. Pl. ed. 4. 3(1): 467. 1800 (!). Syntypes, Crimea and Caucasus.

Tauria et Armenia, *Stephan s.n.* (B, non vidi); isosyntype, "Tauria" (G).

Alyssum blepharocarpum Dudley & Huber-Morath, sp. nov. Holotype, Turkey, *Huber-Morath 13722* (HM); isotype (E). PL. I, FIGS. 1-13.

Affinis *A. huetii* Boiss. sed habitu diverso, fructibus minoribus, stylo longiore, petalis maioribus, glandulis globosis (haud subulatis) differt.

Herba annua, 7-15(-18) cm. alta et lata, e basi ramosa caulibus tenuibus erectis vel patentibus parce foliatis. *Planta* ex toto virescens vel cinereo-cana, saepe ad maturitatem rubro-purpurea, indumento pilis stellatis appressis minute punctatis brevibus ramosis 4-6 radiatis ut videtur multi-radiatis 0.2-0.4 mm. diametro vestita. *Folia* linearia, oblanceolata vel rare subspatulata, obtusa vel acuta, sessilia, vel ad basim sensim attenuata, (3.5-)8-20(-25) mm. longa, 0.5-2 mm. lata, summam versus decrescentia. *Inflorescentia* 5-12(-20) cm. alta et lata, simplex vel corymbosa, ramulis simplicibus ascendentibus 2.5-5(-8) cm. altis. *Pedicelli* 3.5-7.5 mm. longi, subhorizontales vel divergentes inter se 4-7 mm. distantes, pilis stellatis minutis appressis paucibus radiis inaequalibus parce vel copiose provisi. *Sepala* elliptico-ovata vel lanceolata, (1.5-)2.5-3 mm. longa, 0.8-1 mm. lata, margine hyalina angusta, pilis stellatis appressis parce vel copiose vestita, interdum dorsaliter carinata 1-5 pilis stellatis basi manifeste tuberculatis provisa. *Petala* in sicco flava vel subflava, obovata, retusa vel subretusa rare integra, in unguem brevem angustum sensim attenuata, glabra vel solum in ungue pilis stellatis provisa, (2.5-)3-4(-5.5) mm. longa, 1-2.5(-3.5) mm. lata. *Filamenta longa* (1.5-)2-3.5 mm. longa, bilateraliter alata; ala una quam altera latior, 1-3-denticulata, apice libero 0.5 mm. longo. *Filamenta brevia* 1.5-2.5 mm longa, appendice ad basim connato acuto vel minute 2-3-denticulato (0.5-)0.7-1(-1.5) mm. longo. *Glandulae* bene evolutae, globosae, lobatae. *Antherae* auriculatae, apice obtusae vel acutae, 0.5-0.6 mm. longae. *Stylus* glaber, rigidus, tenuis, (0.7-)1-1.5(-2) mm. longus, stigmatate magno provisus. *Silicula* ovato-orbiculata vel elliptica, obtusa vel truncata, rare acuta vel emarginata, 3.5-4.5(-5) mm. longa, (2-)2.3-3.2(-3.8) mm. lata, semper setis tenuibus vel robustis antrorsis basi dilatatis ad marginem provisa, valvis membranaceis manifeste nervosis aequaliter compressis minute papillosis vel glabris vel setis eis ad marginem similibus copiose provisa. *Ovula* in placenta lateraliter inserta, 2 or 3 (4) per loculum. *Semina* brunnea, 1.5-2 mm. longa, 1-1.5 mm. lata, ala (0.1-)0.2-0.3 mm. lata. Fl. Apr.-July, fr. May-July.

DISTRIBUTION AND HABITAT: Anatolian endemic in disturbed situations, cultivated and neglected fields, *Astragalus* and salt steppe, gypsum outcrops and Tertiary rocks; alt. 500-1620 m.

Turkey. A3: Prov. Ankara, Ankara-Sariyar, Sakaryatal, 139 km. westlich Ankara auf Tertiärboden, 26 Apr. 1955, *Walter 1359* (HM); westlich Beypazari,

Yëniköy-Sakarya Strasse, Steppe, 500 m., 27 May 1957, *Kühne 267, 263a* (STU); Beypazari, Nähe Abzweigung nach Tepeköy, Feld, 1 June 1957, *Kühne 496* (STU); Uytepe, Gipfelgrat, Steppe, 7 June 1957, *Kühne 733, 726* (STU). A8: Prov. Gümüşane, dist. Bayburt, Gümüşane-Bayburt, Linsensfeld, 21 km. vor Bayburt mit *A. stylare*, 1620 m., 15 July 1958, *Huber-Morath 16485* (HM). B4: Prov. Konya, Cihanbeyli, steppe, fl. lutea, 7 June 1952, *Davis 18636* (BM, E, K); Prov. Ankara, dist. Kadinhan, Sarayönü-Cihanbeyli, Weizenfeldrand, 13 km. nordöstlich Sarayönü, 870 m., 1 June 1956, *Huber-Morath 13722* (HM, E); Angora (Ankara), Frichès a Kodja-dagh, 8 July 1908, *Frères E. C. 458* (E, G); Kavakli Dere, Steppe im Gelände der Deutschen Botschaft, Andesitlehm, 900 m., 30 May 1958, *Markgraf s.n.* (z); Steppen-Probenfläche, 7 May 1958, *Markgraf s.n.* (z); Bergsteppe, Hussein bei Ankara, 4 June 1932, *Kotte 171* (K); Wegrand am alten Flugplatz von Ankara, 850 m., 11 June 1949, *Huber-Morath 9317* (HM); dist. Şerefli Koçhisar, versalzte Steppe am Tuz gölü, 114 km. südlich Ankara, 11 km. südlich Sekerköy, 920 m., 26 June 1959, *Huber-Morath 16079* (HM); Ankara-Gölkarından, soma yol Lenari, 20 June 1953, *Birand & Zohary 2928* (ANK). B7: Prov. Erzincan, Başköyukten, km. somas Ekim tarlan Lenari, 1020 m., 30 May 1956, *Birand 141* (ANK).

In central and eastern Anatolia, *Alyssum blepharocarpum* grows in small, scattered populations. It is closely related to *A. huetii* Boiss. with which it is broadly sympatric. It differs from the latter by being a more delicate and spreading plant, having smaller and often orbicular or ovate fruits with sparser setae (or none) on the valves, longer styles, larger petals, and globose lobed glands.

In the eastern part of its range *Alyssum blepharocarpum* is partially sympatric with *A. stylare* (Boiss. & Bal.) Boiss., which has its center of distribution farther south in the Cappadocian steppe and which may be distinguished from *A. blepharocarpum* by its longer styles, larger and bifid petals, and larger and elliptic fruits with longer, denser setae on the valves.

In sect. MENIOCUS, *Alyssum huetii*, *A. blepharocarpum*, *A. stylare*, and *A. heterotrichum* Boiss. possess simple stiff setae on their fruits, but *A. blepharocarpum* is the only species among these which has such a wide range of variation in fruit indumentum. When the specimens which are cited above were examined individually it appeared that three different combinations of indumentum types were present on the fruit (PL. I, FIGS. 2-5). These indumentum states are: 1) marginal setae 0.2-0.4 mm. long, the valve surfaces minutely papillose (*Davis 18636*); 2) marginal and surface setae 0.4-0.5 mm. long, the valve surfaces papillose or glabrous (*Huber-Morath 13722*); 3) marginal setae 0.2-0.4 mm. long, the valve surfaces always glabrous (*Huber-Morath 1359b*). It was soon evident when the gatherings were compared with one another that the indumentum on the fruit could not be employed to distinguish three distinct taxa. No geographical pattern emerged to correlate with the three indumentum states which sometimes occurred, not only on different plants from the same population, but also on different fruits of the same plant.

This new species was first pointed out to the author by Dr. A. Huber-Morath in his private herbarium in Basel, Switzerland; however, it was

first collected near Ankara in 1908 by *Frères des E. C.* (No. 458). The Latin and French descriptions which Aznavour attached to this collection were never published, and Dr. Huber-Morath suggested as appropriate the specific epithet *blepharocarpum* (Greek, *blepharis*, eye-lash), referring to the short setae on the fruit.

Section **Alyssum**. LECTOTYPE SPECIES: *Alyssum montanum* L. Sp. Pl. 2: 650. 1753 (!).

Alyssum minus (L.) Rothmaler, Repert. Sp. Nov. 50: 77. 1941. — Breistroffer, Bull. Soc. Bot. Fr. 103 (82 Sess. Extra.): 153. 1956; Heywood, Repert. Sp. Nov. 64: 54. 1961.

Clypeola minor L. Flora Monspeliensis (Nathorst, Dissert. [no. 70] 21. 1756 — non *Amoenitates Academicæ* 4. 1759). Type: Magnol, *Botanicum Monspeliensis* ed. 2. 251. 1688 — “*Thlaspi Alysson dictum minus, capsulis majoribus rotundis, non foliatis.*”

Alyssum campestre L. Sp. Pl. ed. 2. 2: 909. 1763, *pro parte* — non 1759(!). — Turrill, Jour. Bot. (Lond.) 73: 261. 1935; Degen, Fl. Velebitica 2: 187. 1937; Maire, Bull. Soc. Hist. Nat. Afr. Nord 30: 258. 1939; Zohary, Palest. Jour. Bot. Jerusalem Series 2: 161. 1941; Rechinger f. Ark. Bot. II. 2: 345. 1953.

Alyssum parviflorum Bieb. Suppl. Fl. Taur. Cauc. 3: 434. 1819(!). — Turrill, *loc. cit.*; Maire, *loc. cit.*

Frequently, botanists confuse *Alyssum minus* (L.) Rothmaler (= *A. campestre* auct.) with *A. alyssoides* (L.) L. in sect. PSILONEMA. In addition to the subulate, wingless, edentate and unappendaged filaments of the latter, *A. alyssoides* can be separated readily from *A. minus* by having sepals always persistent. The specific epithet, *alyssoides*, was furnished by Linnaeus in *Species Plantarum* (2: 652. 1753) under *Clypeola* No. 2, which he transferred to *Alyssum* in *Systema Naturae*, ed. 10. 1759. Most taxonomists today accept the binomial *A. alyssoides*, which is typified by a specimen extant in the Clifford herbarium (BM), though Linnaeus redescribed this specimen in the second edition of *Species Plantarum* (1763), as *A. calycinum*.

The crux of the problem concerning the application of the binomial *Alyssum minus* or *A. campestre* is the identity and typification of *Clypeola campestris* of *Species Plantarum* (1753). Though *Clypeola* No. 3, found on page 652 of *Species Plantarum*, is not furnished with a trivial epithet, the name *campestris* is found on page 1231 in the Errata. Linnaeus refers to Sauvage, *Methodus Foliorum Monspeliensis* . . . 71. 1751, which reads “No. 405 Clyp. annua siliculis bilocularibus dispermis calyce persistente. . . .” This Sauvage description must be regarded as the basis of *Clypeola campestris*. Though no specimens of *Alyssum* or *Clypeola* in the Linnaean herbarium are marked with an “M,” indicating their origin from Sauvage (cf. Stearn, Introduction to *Species Plantarum*, facsimile, 1957; Savage, 1945), it is logical to assume that Sauvage’s mention of

persistent sepals could apply only to *Alyssum alyssoides*, rather than to the other taxon commonly, but incorrectly, called *Alyssum campestre*, whose sepals are *always early deciduous*. That Linnaeus later altered Sauvage's circumscription in the second edition of *Species Plantarum* to read: ". . . calycibus caducis . . ." is not relevant to the problem of typifying *Clypeola campestris*, or as it later became, *Alyssum campestre* (*Systema Naturae*, ed. 10. 1759).

Further evidence is gathered from the C. Bauhin polynomial, "Alysson dictum campestre minus" (*Pinax*, 107. 1623) which is referred to indirectly by Sauvage through Tournefort (*Institutiones rei herbariae* 1: 217. 1700 — "Alyss. incanum serpilli folio minus"), and directly by Magnol in *Botanicum Monspeliense*, 251 (ed. of 1688). This Bauhin polynomial is cited by Linnaeus in *Species Plantarum* (1753) as a synonym of *Clypeola campestris* and as a possible synonym of *Clypeola alyssoides* in *Hortus Cliffortianus* (329. 1738). Linnaeus in *Flora Monspeliensis* (Nathhorst, Dissert. [no. 70] 21. 1756.) refers *Clypeola campestris* to No. 1137 in Magnol's work. Linnaeus's own copy of this work (at the Linnean Society, London) is numbered in his handwriting, and No. 1137 falls on the entry (page 251) which reads: "Thlaspi dictum campestre minus"

Dr. M. Geiger-Huber, of the Botanisches Institut der Universität Basel, Switzerland, states (in a letter) that, although there are no authentic specimens of "Alysson dictum campestre minus" in the Bauhin Herbarium, C. Bauhin wrote in the *Catalogus Plantarum circa Basileam . . .* (1622) that it was common in the fields around Basel. As only two species of *Alyssum* are known to occur near Basel, the alpine *A. montanum*, and the common weed, *A. alyssoides*, it may be inferred that the Bauhin polynomial refers to the latter.

Rather than increase the nomenclatural confusion which would be implicit if the binomial *Alyssum campestre* were substituted for *A. alyssoides*, it is preferable to retain *A. alyssoides* for the taxon with *persistent sepals*, and treat *Alyssum campestre* as a synonym of it.

Now that it is clear that *Alyssum campestre* can be reduced to a synonym of *A. alyssoides*, the next unambiguous binomial must be found and applied to the plant which has long masqueraded as *Alyssum campestre* and which has *early deciduous sepals*.

Turrill (1935), who recognized the confusion implicit in the Linnaean *Alyssum campestre*, claimed that Linnaeus himself used the name in different senses and suggested that since this initial confusion has been a persistent source of error "*A. campestre*" should be rejected as a *nomen confusum*. He advocated the application of *A. parviflorum* Bieb. (1819), as did Maire in 1939. It is interesting to note that, in 1808, Marschall von Bieberstein used *A. campestre* in the sense of *A. alyssoides*. The view that *A. parviflorum* is the correct epithet for this species has been followed by a number of authors; however, none has mentioned *Clypeola minor* L. *Flora Monspeliensis*. 21. 1756. In his extensive enumeration of the Linnaean taxa found in the *Dissertationes* and the *Amoenitates Aca-*

demicae, Rothmaler (1941) pointed out that *Clypeola campestris* on page 21 of *Flora Monspeliensis* (1756) was to be referred to *Clypeola alyssoides*. What is more important is that Rothmaler recombined *Clypeola minor*, which occurs on the same page, as *Alyssum minus*, but he was wrong in equating it with *A. campestre* (1759), the basionym of which is *Clypeola campestris* (*Sp. Pl.* 2: 650 & 1231. 1753) (cf. Heywood, 1961).

At this point it might prove useful to hypothesize that Linnaeus recognized the confusion surrounding his usage of the epithet *campestre* and attempted to rectify it. In the second edition of *Species Plantarum* he altered the original diagnosis of *Clypeola campestris*, which he had taken from Sauvage, *Methodus Foliorum Monspeliensis*. . . (1751), to read "*calycibus caducis*," thereby hoping to exclude *Clypeola* (*Alyssum*) *alyssoides*, which has persistent sepals. In the same work, attempting to drop the epithet *alyssoides* entirely from use, Linnaeus redescribed *Alyssum alyssoides* as *Alyssum calycinum* from the same type in the Clifford herbarium. Unfortunately, the specimens which Linnaeus (LINN) used to describe *Alyssum campestre* for the second edition of *Species Plantarum* are mixed; among them is a plant (No. 828:10) of *A. alyssoides* which is labelled in Linnaeus's handwriting as *A. campestre*. Except for the type of *A. alyssoides* in the Clifford herbarium, there are no specimens of *Alyssum* now existing which Linnaeus could have used for the first edition of *Species Plantarum*. In the republished version of *Flora Monspeliensis* in the *Amoenitates Academicae* 4. 1759, Linnaeus deleted *Clypeola minor*, which appeared first in the *Dissertationes*, and for it substituted *Clypeola alyssoides*. Though Linnaeus tried to drop the binomial *Clypeola minor* at this point, priority rights must be adhered to, and Rothmaler's combination of *Clypeola minor* as *Alyssum minus* should be accepted as referring to the taxon with deciduous sepals.

In the Dissertation edition of *Flora Monspeliensis*, Linnaeus refers *Clypeola minor* to No. 1138 in Magnol, *Botanicum Monspeliense* (ed. of 1688). Because of the discordant elements in the Linnaean herbarium, none of which can be directly applied as the lectotype of *Clypeola minor*, Magnol's description is accepted as the basis of *Alyssum minus*. In Linnaeus's numbered copy of Magnol's work (Linnean Society, London), No. 1138 is found on page 251 and reads: "Thlaspi Alysson dictum minus capsulis majoribus rotundis, non foliatis; Thlaspi montanum luteum I.B. in priori juxta capsulam quatuor adsunt foliola viridia, in isto vero nulla sunt, capsulae etiam multum differunt; in iisdem locis reperitur, & eodem tempore floret. Addit I.B. Thlaspi montanum minimum Monspeliensium folio laciniato, circa Boutonet collectum, quid sit ignoramus." The two polynomials which Magnol refers to in his circumscription are to be found in J. Bauhin, *Historia Plantarum* 2. 1651. The first of these "Thlaspi montanum luteum . . ." is found on page 928 of Bauhin's work and is accompanied by a figure which can be identified as the taxon commonly referred to as "*Alyssum campestre*," with deciduous sepals and large fruits. This figure cannot be applied to *A. alyssoides* which always has persistent sepals and smaller fruits. The most important character in Magnol's

description is, of course, “. . . capsulis majoribus rotundis, non foliatis . . .” (indicating deciduous sepals), which is clearly contrasted with Sauvage’s description of that which became *Clypeola campestre* (*Alyssum campestre*), reading: “. . . calyce persistente . . .” The view is taken here that the Magnol description, “Thlaspi Alysson dictum minus capsulis majoribus rotundis, non foliatis . . .” (but not including his synonyms) constitutes the type of *Clypeola minor* (*Alyssum minus*), and that to take Bauhin’s figure as the type would be an unwise extension of the evidence, for this was not the material upon which Magnol’s description was based. It may only be taken as additional proof of identity. It is of incidental interest that Magnol’s herbarium went to Sauvage, whose herbarium in turn went to Linnaeus. The other polynomial in Bauhin, *Historia Plantarum*, “Thlaspi montanum minimum Monspeliensium folio laciniato,” also cited by Magnol, is found on page 929 of Bauhin’s work. It is impossible to tell from this description the taxon to which it should be referred. There is no figure.

The establishment of *Clypeola minor* as the basionym of the taxon with deciduous sepals necessitates reducing to synonymy the binomial *Alyssum parviflorum*, which has at one time or another been suggested as the correct name.

Alyssum campestre sensu lato as used by many authors (e.g., Busch, 1909) has long been an anomaly with regard to its specific limits. My own interpretation of *A. minus* is in the narrow sense, and is applied to the widespread European and Oriental annual weed with *homomorphic* indumentum (only one type of hair) on the fruits. The taxa with *dimorphic* fruit indumentum of small stellate hairs with appressed or divergent rays in addition to furcate or simple, long and tuberculate hairs (e.g., *A. strigosum* Banks & Solander and *A. hirsutum* Bieb.) are excluded from *A. minus*. In addition to the homomorphic indumentum of fruit and style, the usually smaller, elliptic or ovate, and asymmetrically inflated fruits of *A. minus* var. *minus* distinguish it from *A. strigosum*. Some difficulty may be experienced in distinguishing *A. minus* var. *micranthum* (Meyer) Dudley from *A. strigosum* because of the similarity of their fruits, but the indumentum of the fruits and pedicels is always diagnostic for *A. strigosum*. Though the indumentum of the pedicel of *A. minus* var. *micranthum* frequently appears strigose, this condition is *not* due to the presence of two types of hairs, but to the spreading, divergent and unequal rays of the stellate hairs. The glabrous and shorter styles and the divergent-spreading pedicels of *Alyssum strigosum* are also of value in separating this taxon from *A. minus* var. *micranthum*. It must, however, be stressed that the most reliable diagnostic character of *A. strigosum* is the occurrence of dimorphic indumentum on its fruits and pedicels. This character is easily observed on immature fruits and ovaries, as well as on those which are fully developed.

Although *Alyssum minus* is extremely polymorphic in its habit and fruit size, probably because of the diverse environments in which it grows, the specific limits are no longer as confused as indicated by Reehinger f.

(1953). The exclusion of *A. strigosum* with its dimorphic indumentum allows *A. minus* to be conveniently defined in a narrow sense.

***Alyssum minus* (L.) Rothm. var. *micranthum* (Meyer) Dudley, comb. nov.**

A. micranthum Meyer, Ind. Sem. Petrop. 1: 22. 1835(!). Lectotype, Russia. In Campis ad Mare Caspium, Lenkoran, Meyer s.n. (LE, non vidi); isotypes (G, W).

A. campestre var. *micranthum* (Meyer) Boiss. Fl. Or. 1: 284. 1867 — *pro parte*(!).

A. minus subsp. *micranthum* (Meyer) Briest. Bull. Soc. Bot. Fr. 103(82 Sess. Extra.): 154. 1956.

DISTRIBUTION AND HABITAT: Sporadically in northern Greece, Crete, North Africa, Crimea, Caucasus, Transcaspien, Turkish and Russian Armenia, northern Turkey, Syria, Lebanon, Israel, Jordan and northern Iran; waste land, cultivated fields and pastures, steppic hillsides, river valleys, forestry plantations, dry south-facing igneous, limestone and gypsum slopes; alt. (30–)500–1600(–2200) m. Fl. (Feb.–) Apr.–June.

The major features distinguishing this taxon from the typical expression of *Alyssum minus* are its larger orbicular fruits, its longer styles, which are only sparsely pubescent, and the coarser and sparser stellate hairs with longer and unequal divergent rays on the fruits, as noted in the following key.

Styles 0.7–1.3 mm. long, covered their entire length with dense, appressed and short-rayed stellate hairs; rays of stellate hairs on fruit overlapping, equal in length, 0.3–0.5 mm. long; fruit elliptic-ovate, 3–4.5 (–5) × 2.5–4 mm., obtuse or rarely emarginate; pedicels ascending; long filaments 0.1–0.8 mm. wide. Var. *minus*.

Styles 1–2 mm. long with sparse, long and divergent-rayed stellate hairs at their bases; rays of stellate hairs on fruit not overlapping, unequal in length, 0.5–1 mm. long; fruit orbicular, 4–7.5 mm. long and wide, emarginate; pedicels horizontal; long filaments 0.3–0.4 mm. wide. . . Var. *micranthum*.

These differential characters of the varieties of *Alyssum minus* are obvious when typical material of each is examined, but in some geographical areas intermediate specimens are quite numerous, i.e., North Africa, Iraq and Iran. In the light of the occurrence of intermediates, and the fact that var. *micranthum* occurs sporadically as small populations, recognition at any rank other than variety would not be justified.

***Alyssum strigosum* Banks & Sol. subsp. *cedrorum* (Schott & Kotschy) Dudley, stat. nov.**

A. cedrorum Schott & Kotschy, Österr. Bot. Wochenbl. 11: 169. 1854 (!). Holotype, Turkey, C5: Prov. Icel. In Tauro inter Cedros, Kotschy s.n. (cultivated from seed in the Vienna Botanic Gardens, w); isotype (G).

A. strigosum var. *cedrorum* (Schott & Kotschy) Briest. Bull. Soc. Bot. Fr. 103(82 Sess. Extra.): 154. 1956 (!).

DISTRIBUTION AND HABITAT: Found mainly in the Lycian and Cilician Taurus, and extending into Cyprus and northeastern Anatolia. Disturbed and ruderal situations, neglected and cultivated fields, limestone slopes and scree, volcanic plateaus, steppe; often in *Quercus* scrub and *Pinus brutia* woods; alt. 300–1700 m. Fl. Apr.–July.

This taxon was originally thought to be a species distinct from *Alyssum strigosum*, but the presence of a large number of intermediate specimens from Anatolia and Cyprus (mostly occurring within the range of subsp. *cedrorum*) indicates that subspecific rank is more appropriate. The relatively limited distribution of subsp. *cedrorum* is completely contained within the much wider area covered by subsp. *strigosum*. In addition to being a common plant in practically every province of Turkey, subsp. *strigosum* is prevalent throughout southern and eastern Europe, North Africa, and the Levant, extending east into Afghanistan.

The following key indicates the distinguishing characteristics of the subspecies of *Alyssum strigosum*.

- Sepals early deciduous; bifurcate hairs on fruit stiff, 0.4–0.6(1) mm. long; styles 0.5–1 mm. long; petals entire or emarginate, 2.5–3 mm. long; fruit 3–5.5 mm. long and wide. Subsp. *strigosum*.
 Sepals persistent; bifurcate hairs on fruit \pm sericeous, 1–1.5 mm. long; styles 1–1.5 mm. long; petals bilobed, 4–4.5 mm. long; fruit 5–6.5 \times 4–7 mm. Subsp. *cedrorum*.

***Alyssum trichocarpum* Dudley & Huber-Morath, sp. nov.** Holotype, Turkey, *Huber-Morath 9253* (HM); isotype (E). PL. II, FIGS. 12–22.

Affinis *A. cephaloti* Boiss. et *A. xanthocarpo* Boiss. sed a priore racemi elongati (haud globoso-congesti), habitu minus robusto, foliis summam versus decrescentibus haud involucreatis, stylo pilis stellatis minoribus et parcioribus differt; a posteriore fructibus minoribus formae diversae et indumento densiore radiis pilorum stellatorum longioribus recedit.

Planta annua, patens, e basi multiramosa, (8–)15–20(–30) cm. alta et lata. *Caules* decumbentes vel ascendentes basi haud ramosi, rubro-purpurei. *Folia* post anthesin decidua, sessilia vel breviter petiolata, obovata vel oblanceolata, ad basim sensim attenuata, acuta, 10–15(–20) mm. longa 2.5–4(–7) mm. lata, summum versus decrescentia, pilis stellatis parcis vel densis semper basi tuberculatis radiis antrorse suberectis paucis longis inaequalibus rare ramosis vestita. *Racemus* 5–10 cm. longus, simplex, cylindricus, erectus, in statu florescenti 1–1.5 cm. lato, deinde dense fructiferus apice globoso. *Pedicelli* rigidi, divaricati vel ascendentes, recurvi, 4–7 mm. longi, indumento dimorpho parco vel denso pilis stellatis radiis longis antrorse suberectis inaequalibus et radiis longissime sinuatis sericeis basi tuberculatis inaequalibus tecti. *Sepala* subpersistencia, basi angulato-saccata, subcarinata, margine angusta hyalina, ovata, 3.5–4 mm.

longa, 1 mm. lata, indumento denso dimorpho pilis stellatis radiis longis parcis suberectis et praesertim apicem versus pilis parcis vel multis longissimis antrorse erectis simplicibus vel bifurcatis basi manifeste tuberculatis tecta. *Petala* obovata, basi cuneata, retusa vel bifida, (4-)5-6 mm. longa, 1-2 mm. lata, in unguem sensim attenuata, indumento denso solum pilis stellatis radiis crassis parcis rare ramosis tecta. *Filamenta longa* inaequaliter bilateraliter alatis, 3.5-4.5(-5) mm. longa, ala una quam altera 2-plo latior dentibus minutis 2-3 supra medium provisa, ala altera apicem versus abrupte contracta vel dentata. *Filamenta brevia* 3-4(-4.5) mm. longa, appendice 0.8-1(-1.3) mm. lato, in dimidio inferiore connata. *Glandulae* valde conspicuae globosae. *Stylus* subrostratus, basi manifeste dilatatus, 2-3.5 mm. longus, dense pilosus in dimidio inferiore pilis stellatis minutis radiis paucis brevibus divergentibus praeditus, stigmate magno globoso provisus. *Silicula* duoseminata, pallide flavo-viridia, orbiculata, acuta vel ad basim attenuata (3.5-)4-5(-6.5) mm. longa, 3-4.5 mm. lata, valvis cartilagineis difficiliter separabilibus subcompressis \pm aequaliter inflatis indumento denso dimorpho pilis stellatis appressis vel subappressis ramosis radiatis et pilis simplicibus vel bifurcatis (1-)2-3 mm. longis antrorse ascendentibus sinuatis sericeis basi tuberculatis (tuberculis globosis inflatis (1.5-)2.5-3 mm. altis!) provisa. *Ovula* dua per loculum. *Semen* fuscum vel subnigrum, 2.5-3.5 mm. longum, 2-2.5 mm. latum, ala 0.05-0.1 mm. lata, valde crenulata. Fl. May-June, fr. June-July.

Turkey. B6: Prov. Malatya, Darende-Akçadağ, ca. 50 km. östlich Darende, Kalkmergel, 1450-1480 m., 20 June 1949, *Huber-Morath* 9253 (HM; E). B5: Prov. Yozgat, Akdağmadeni, Aktaş, June 1960, *Curtis* 124 (E).

This rare and unusual annual belongs in the species complex of sect. ALYSSUM which includes *Alyssum strigosum* Banks & Sol., *A. xanthocarpum* Boiss., *A. hirsutum* Bieb., *A. bulbotrichum* Hausskn. & Bornm. and *A. cephalotes* Boiss. The new species shares with all of these the annual habit and dimorphic indumentum on the fruit. It may be distinguished from *A. cephalotes*, one of its closest allies, by the elongate fruiting raceme, more reduced form of growth, uppermost leaves which are not involucrate but are smaller than the basal leaves, and indumentum on the style composed of minute stellate hairs only. The new species may be separated from *A. xanthocarpum* by smaller, orbicular fruits with denser indumentum composed primarily of much longer and more strongly tuberculate hairs. *A. trichocarpum* may further be distinguished from all species in the complex by the outwardly arcuate pedicels and the very thick fruit valves separated only with difficulty.

***Alyssum praecox* Boiss. & Bal. var. albiflorum Dudley, var. nov.**

Holotype, Turkey, B5: Prov. Kirşehir, Sifegöl, near Mucur, salt marsh in zone nearest lake, in stiff clay, leaves succulent, flowers white, 17 June 1954, *Davis* 21795 (E); isotypes (BM, K).

A typo floribus albis et habitu halophilo differt.

This new variety is a local and extremely halophytic low altitude race which formed a large population in the clay zone nearest the edge of a small salt lake in central Anatolia. It differs from the high altitude typical variety in possessing white flowers and somewhat more succulent leaves (features originally noted on the label). Its distinctness is supported by the additional information that the nearest station of the yellow-flowered typical variety of *A. praecox* lies ca. 100–150 miles to the south in the high mountains of the Anti-Taurus. The habitat of var. *praecox* is predominantly alpine, at altitudes of 1500–2600 meters. The plants of var. *praecox*, more often than not, are found very near the snow line. The distribution of var. *praecox* is that of a typical alpine or montane eastern Anatolian species, extending from the Cilician Taurus to the Armenian Highlands, and occasionally into Turkish Kurdistan. The altitude of the type locality, in the steppe, of var. *albiflorum* is approximately 600 meters. The vegetation present there is predominantly of Irano-Turanian elements, and is similar to that found at most Anatolian salt lakes. The substrate on which var. *praecox* is found is calcareous in nature, or rarely igneous.

Section **Gamosepalum** (Hauskn.) Dudley, comb. & stat. nov.

Gamosepalum Hauskn. Mitt. Thür. Bot. Ver. 11: 73. 1897 (!). LECTOTYPE SPECIES: *Alyssum lepidoto-stellatum* (Hauskn. & Bornm.) Dudley.

Series **Connata** Dudley, ser. nov. TYPE SPECIES: *Alyssum lepidoto-stellatum* (Hauskn. & Bornm.) Dudley.

Filamenta longa connata. Indumentum e pilis stellatis pauciradiatis (radiis ramosis) compositum. Petala albida vel pallide flava, limbo basi saepe purpureo-venoso.

Alyssum lepidoto-stellatum (Hauskn. & Bornm.) Dudley, comb. nov.

Gamosepalum lepidoto-stellatum Hauskn. & Bornm. Mitt. Thür. Bot. Ver. 11: 73. 1897 (!). Holotype, Turkey, A/B 6: Prov. Sivas, in Ponto Australi in declivibus apricis inter Sivas et Mt. Yyldisdagh (Yildis dağ), 1300–1400 m., 6 June 1890, *Bornmüller 1671* (JE, non vidi); isotypes (BM, G).

Gamosepalum confine Hauskn. *op. cit.* 74 (!). Lectotype, Turkey, B7: Prov. Erzincan, Chama on Euphrates, 1890, *Sintenis 2161*, (JE, non vidi); isolectotype (K).

DISTRIBUTION AND HABITAT: Turkish endemic from the central and southern steppe areas and calcareous hills; alt. 1300–1524 m. Fl. May–June.

The reasons for recognizing *Gamosepalum* as a section within *Alyssum*, rather than as a distinct genus, will be considered in a later paper.

The type species, *Alyssum lepidoto-stellatum*, is easily separated from *A. paphlagonicum* (Hauskn.) Dudley, with which it has sometimes been confused, by its merely retuse and sparsely pubescent petals, shorter styles,

more spreading usually horizontal pedicels and few-fruited condensed racemes. The habit of *A. lepidoto-stellatum* is more dwarf and caespitose than the mostly erect, luxuriant, and coarse habit of *A. paphlagonicum*.

Schulz (1927) reduced *Gamosepalum confine* to synonymy under *G. lepidoto-stellatum* Hausskn. & Bornm. The lectotype collection of *G. confine* (*Sintenis* 2161) matches *Alyssum lepidoto-stellatum* (Hausskn. & Bornm.) Dudley in all characters except its petals (ca. 6 mm. long), which are nearly as large as the largest found in *A. paphlagonicum*. The other specimen of *G. confine* cited and collected by Haussknecht (Iran, Monte Singara Mesopotamiae, May 1867) has not been seen. Although Haussknecht claims to have been unable to distinguish his specimen from the type of *G. confine* (= *A. lepidoto-stellatum*), from the diagnosis in which he contrasts the Iranian plant with the type of *A. lepidoto-stellatum*, I think he may possibly have had *A. sulphureum* Dudley & Huber-Morath.

***Alyssum paphlagonicum* (Hausskn.) Dudley, comb. nov.**

Gamosepalum paphlagonicum Hausskn. Mitt. Thür. Bot. Ver. 11: 74. 1897 (!). Holotype, Turkey, A4/5: Prov. Kastamonu, Paphlagoniae, dist. Kastambuli, in montosis supra Kissiltscha (Kisilia-Kisilca) pr. Tossia, 24 May 1892, *Sintenis* 3865 (JE, non vidi); isotypes (BM, G, K).

DISTRIBUTION AND HABITAT: Endemic to central and northeastern Anatolia, in vineyards, serpentine and noncalcareous areas, and *Artemisia* steppe; alt. 800–1372 m. Fl. May–June.

This species is partially sympatric with *Alyssum lepidoto-stellatum*. In addition to the differential characters cited in the discussion of *A. lepidoto-stellatum*, *A. paphlagonicum* possesses several other distinctive characteristics. The sepals of *A. paphlagonicum* show a tendency to be slightly inflated and are separable with difficulty at maturity. Those of *A. lepidoto-stellatum* do not illustrate any obvious inflation and are easily separated at maturity. The overall indumentum of *A. paphlagonicum* is composed of larger and coarser stellate hairs, and the floral parts are, on the average, larger than those of *A. lepidoto-stellatum*. However, on individual specimens the range of variation is too great to allow these species to be safely distinguished on such quantitative characters. *Alyssum paphlagonicum* appears to have an edaphic preference for serpentine or igneous rubble, whereas *A. lepidoto-stellatum* is confined almost entirely to calcareous soils.

***Alyssum thymops* (Huber-Morath & Reese) Dudley, comb. nov.**

Ptilotrichum thymops Huber-Morath & Reese, Repert. Sp. Nov. 52: 40. 1943 (!). Holotype, Turkey, C/5: Prov. Niğde, Cappadocien, Steppe bei Bor. Vilajet Niğde, 10 June 1937, *Reese s.n.* (HM); isotype (E).

DISTRIBUTION AND HABITAT: Endemic to central Anatolia in steppe, wheat fields, eruptive stones; in association with *Pinus nigra*; alt. 980–1560 m. Fl. June.

Huber-Morath (1943) correctly points out that his *Ptilotrichum thymops* is morphologically closer to *Gamosepalum lepidoto-stellatum* than any oriental species of *Ptilotrichum* sensu Meyer. He noted, however, that the connate sepals and connate long filaments characteristic of *Gamosepalum* were not found in his *Ptilotrichum thymops*. Examination of the type material of *Ptilotrichum (Alyssum) thymops* revealed that the fusion of its long filaments, the "pseudo-connation" of its sepals, and its indumentum of few-rayed stellate hairs (not lepidote as indicated by Huber-Morath) were consistent. These features ally it directly to the complex in sect. GAMOSEPALUM (series *Connata*) containing *A. tetrastemon* Boiss., *A. lepidoto-stellatum*, and *A. paphlagonicum*.

Alyssum thymops, which is partially sympatric in the central Anatolian steppe with two of its closest allies, *A. tetrastemon* and *A. paphlagonicum*, may be distinguished from these by the weakly dimorphic and sparse short-rayed hairs on the sepals; the obovate, glabrous, pale cream petals; the very narrow linear-oblong leaves; and the noninvolucrate cauline leaves. The narrow wings of the long filaments of *A. thymops* led Huber-Morath to describe "stamina non alata." These wings, which are narrower than those of any other species in sect. GAMOSEPALUM, are of further distinguishing value.

Series **Libera** Dudley, ser. nov. TYPE SPECIES: *Alyssum baumgartnerianum* Bornm. ex. Baumg. Jahresb. Kaiser Franz Josef-Land. Gymn. Oberrealsch. Baden bei Wien 48: 16. 1911. Lectotype, Lebanon. Libanon, Dschebel Barûk ad nives, 2100 m., 15 June 1910, *Bornmüller 11405* (w); isolectotypes (BM, E, G, K).

A serie *Connatis* filamentis longis contiguis liberis (non connatis), indumento pilis lepidotis multo-radiatis, petalis sulphureis haud purpureo-venosis recedit.

Alyssum corningii Dudley, sp. nov. Holotype, Turkey, *Dudley (D. 35911)* (E); isotypes (A, HM). PL. III, FIGS. 1-11.

A. tetrastemon Boiss. var. *cappadocicum* Boiss. Fl. Or. 1: 278. 1867 (!). Holotype, Turkey, *Balansa 493* (G); isotype (GH) — non var. *cappadocica* Boiss. 1842.

A. tetrastemon sensu Baumg. Jahresb. Kaiser Franz Josef-Land. Gymn. Oberrealsch. Baden bei Wien 48: 5. 1911 (!) — non Boiss. 1842.

Affinis *A. tetrastemon* Boiss. sed habitu diverso, indumento ex toto fere monomorpha pilis stellatis paucis radiatis brevibus, foliis haud involucratibus, racemi elongati multifructi differt.

Herba perennis suberecta vel patens, basi multiramosa et suffruticosa, 7-12 cm. alta, 5-10(-15) cm. lata. *Planta* ex toto indumento cinereo-cano e pilis stellatis densis punctatis semper stipitatis interdum manifeste basi tuberculatis 0.2-0.4 mm. latis radiis brevibus vel longis 5-10 radiatis crassiusculis suberectis (rare appressis) inaequalibus multiramosis vel

lepidotis composito. *Caules floriferi* ascendentes vel erecti, 2–7(–12) cm. longi. *Surculi steriles* dense foliati, basi caulium floriferorum conferti, 1–3 cm. longi. *Folia caulium floriferorum* linearia, oblonga vel oblanceolata, acuta, sensim in petiolum attenuata, 6–10 mm. longa, 1.5–2(–2.5) mm. lata; superiora longiora et latiora, ad marginem saepe subhirsuta, non involucrata. *Folia caulium sterilium* lineari-oblanceolata, acuta vel rare obtusa, 6–10 mm. longa, 0.5–1(–1.5) mm. lata, pilis stellatis quam eis foliorum caulium floriferorum densioribus et minoribus. *Racemus* simplex, brevibus, saepe confertus, rare subumbelliformis, post anthesin elongatus, saepe corymbosus ramulis aequalibus 1.8–2(–2.5) cm. longus. *Pedicelli* erecto-patentes, stricti, rigidi, subrecurvi, 3–6 mm. longi, pilis stellatis furcatis et suberectis sicut sepala obsiti. *Sepala* basi subsaccata, lanceolata vel ovata, acuta, 3–3.5 mm. longa, 1–1.5 mm. lata, obscure pseudoconnata ob pilis intertextis cohaerentia, facile separabiles, extus indumento pilis stellatis appressis et rare apicem versus pilis furcatis basi tuberculatis radiis delicatissimis sinuatis inaequalibus sericeis sparse vel dense provisa, intus pilis stellatis radiis delicatulis inaequalibus sericeis obsita. *Petala* in sicco pallida, late spatulata, integra vel subretusa, 4.5–5.5 mm. longa, 1–1.5 mm. lata, infra constrictionem medianam ungue alata (ala denticulata 0.4–0.6 mm. lata) munita, nervo mediano unguis pilis stellatis parcis radiis haud ramosis proviso. *Filamenta longa* 3–4 mm. longa, libera, contigua, bilateraliter anguste marginata, superne sensim contracta, basi vel etiam ad medium rare conniventia sed facile separabiles pilis stellatis parcis minutis provisa. *Filamenta brevia* (1.8–)2–3.5 mm. longa, basi dente brevissimo 0.2–0.3 mm. longo provisa. *Stylus* rostratus vel subrostratus, 1.5–2.5(–3) mm. longus, in dimidio inferiore pilis stellatis minutis multiradiatis parce vel dense provisus. *Silicula* uniseminata vel rare duoseminata, orbicularis, ovata, truncata vel submarginata, 3.5–4 mm. longa, 2.5–3.5 mm. lata, valvis cartilagineis aequaliter vel inaequaliter inflatis indumento cano dense vestitis. *Ovula* dua per loculum. *Semen* immaturum, alatum. Fl. et fr. June.

DISTRIBUTION AND HABITAT: Entirely confined to the central Anatolian steppe; alt. 1050–1500 m.

Turkey. B4: Prov. Ankara, Giarrkale bei Haymana, Berg Steppe, *Kotte* 1165 (κ). B5: Prov. Niğde, Tuff bei Niğde, 1100 m., 4 June 1898, *Siehe* 60 (B, BM, G, κ, w). C4: Konya to Sultanhanı on new road, 18 miles from Konya, 1050 m., in new enclosed forestry plantation, steppic habitat, pale lemon flowers, rare, 16 June 1962, *Dudley* (*D.* 35911) (E; A, HM); Steppen bei Divle (Karaman-Ereğli), 1300 m., June 1906, *Siehe* 241 (E); Sarayönü, civari Step yel Lenari, May 1943, *Birand s.n.* (ANK). C5: Prov. Seyhan, Partie superieure de la Vallee du Kamechly-Tchai (Keamşli), 1490–1500 m., 16 June 1856, *Balansa* 493 (G, GH).

Alyssum corningii was first described as *A. tetrastemon* var. *cappadoci-cum* by Boissier (1867), who differentiated it from the typical *A. tetrastemon* because it possessed “. . . pili omnes lepidoti et caules saepe ramulosi.” This description may be contrasted with “basi suffrutescens lepi-

dotum et insuper breviter tomentoso-hirtum caulibus humilibus . . . ,” given by Boissier (1867) for *A. tetrastemon* sensu stricto. Boissier’s var. *cappadocicum*, of 1867, is antedated by his var. *cappadocica*, of 1842, which was based on a different type and is obviously a synonym of *A. tetrastemon* sensu stricto.

The indumentum of *Alyssum corningii* is for the most part monomorphic and appressed and is lepidote in the lower portions of the plant. That of *A. tetrastemon* is dimorphic and distinctly hirsute and is tomentose especially on the sepals, pedicels, and upper stems and leaves. Baumgartner (1911, pp. 5, 6) stated that the indumentum difference did not justify describing a new species. In fact, Baumgartner had only the *Siehe 60* collection of *A. corningii* at his disposal. However, examination of all available material indicates that the indumentum character is of differential value when combined with the other consistent diagnostic characters. Accordingly, Boissier’s var. *cappadocicum* of 1867 should be maintained as a distinct species.

In addition to the characters detailed by Boissier, *Alyssum corningii* may be separated from *A. tetrastemon*, the taxon with which it is most easily confused, by the closely adjacent and overlapping, but free long filaments (rarely connate at their bases), the narrower cauline leaves which are not involucrate, and the many-fruited, elongate racemes.

The distribution and general ecology of *Alyssum corningii* and *A. tetrastemon* do not appear to be mutually exclusive, though they have never been found growing together. Both species probably represent branches from a common ancestor within the perennials of sect. ALYSSUM and are closely allied to *A. iranicum* Baumg., *A. aizoides* Boiss., *A. bornmuelleri* Hausskn. ex Degen, *A. doerfleri* Degen, *A. taygeteum* Heldr., and *A. caespitosum* Baumg.

The specific epithet of this new taxon honors a friend and benefactor, the Honorable Erastus Corning II, of Albany, New York, whose support and interest made my investigations of *Alyssum* at Edinburgh a reality.

***Alyssum sulphureum* Dudley & Huber-Morath, sp. nov.** Holotype, Turkey, *Huber-Morath 11969* (HM); isotype (E). PL. IV, FIGS 13–26.

Gamosepalum paphlagonicum sensu Bornm. Symb. Fl. Anat. 59. 1936, pro parte quoad plantam Mesopotamiam a Handel-Mazzetti lectam — non Hausskn. (!).

Affinis *A. bornmuelleri* (sect. ALYSSUM), *A. aizoidi* (sect. ALYSSUM) et *A. harputico* Dudley (sect. GAMOSEPALUM), sed ob omnibus speciebus habitu diverso, sepalis angustioribus margine membranaceo, appendice filamentorum brevium multo brevioribus differt; insuper a primo forma squamarum lepidotorum, petalis retusis vel bilobatis recedit; a secundo filamentis longis edentatis, unguibus petalorum pilis stellatis provisus divergit; a tertio indumento diverso, petalis majoribus, pilis stellatis forma foliorum distinguitur.

Herba perennis, suffruticosa, dense caespitosa, pusilla, multiramosa, sed ad basim efoliata, (5-)10-20 cm. alta. *Planta* ex toto indumento denso appresso cinereo-argenteo squamis minute punctatis lepidotis (0.2-)0.3-0.5 mm. diametro vestitis, sed superne et in marginibus (rare in paginis ambobus) foliorum superiorum indumento ut in sepalis dimorpho obsita, pedicellis et sepalis pilis stellatis radiis longis sericeo-villosis vestitis. *Caules floriferi* erecto-ascendentes, parce foliati, (2.5-)8-10 cm. longi. *Surculi steriles* numerosi, densissime conferti, patentes, dense foliati, 1.2-5 cm. longi. *Folia caulium floriferorum* lineari-oblancoolata, sessilia, acuta, (5-)10-15 mm. longa, 1.5-2(-2.5) mm. lata, ascendentes, superiora sensim incrementia, post anthesin decidua; summa involucreta. *Folia caulium sterilium* oblancoolata vel subspatulata, acuta, (2-)6-10 mm. longa, 1.5-2 mm. lata. *Corymbi* umbelliformes capitato-rotundati, congesti, 1.5-2 cm. longi et lati, floribus 5-15. *Pedicelli* in statu fructifero 3-4.5(-6) mm. longi, crassi, rigidi, ascendentes vel subhorizontales, indumento dimorpho eo sepalorum simili dense obtecti. *Sepala* subpersistencia, apice cucullata, inaequalia, acuta, pseudoconnata, (3.5-)4.5-5.5 mm. longa, (1.5-)2-3 mm. lata, margine hyalina angusta, 0.1-0.2 mm. lata squamis lepidotis tecta in dimidio inferiore intertexto connata, extus squamis lepidotis minute punctatis argenteis 0.3-0.4 mm. diametro apicem versus indumento dimorpho e pilis stellatis basi tuberculatis sericeo-villosis radiis inaequalibus longis paucis vel numerosis 0.5-1 mm. longis squamis lepidotis composito, intus indumento dimorpho parce vel dense obtecta e pilis stellatis radiis sericeis valde inaequalibus duobus longis antrorse appressis et pilis stellatis radiis aequalibus brevibus composito. *Petala* sulphurea, late spatulata, retusa vel bilobata, (5.5-)6-8 mm. longa, 2.5-3 mm. lata; unguis ad medium constrictus alis latis membranaceis saepe integris, nervo mediano pilis stellatis sublepidotis radiis paucis vel multis suberectis dense vel sparse obsito. *Filamenta longa* 4.5-5.5(-6) mm. longa, libera, non connata sed verum contigua, edentata, anguste bilateraliter alata, ad basim sensim dilatata. *Filamenta brevia* 3-4.5 mm. longa, angustissime alata ad basim appendice brevissima minuta praedita. *Antherae* auriculatae, apice acutae, 1 mm. longae. *Stylus* in statu fructifero, tenuis ad basin dilatatus, (2-)3-3.5(-4) mm. longus, glaber vel in dimidio inferiore pilis stellatis radiis suberectis obsitus. *Silicula* uniseminata, rare duoseminata, orbiculata vel obovata, truncata vel obtusa, (4-)5-5.5(-6) mm. longa, 3.5-4.5 mm. lata, valvis cartilagineis manifeste inaequaliter inflatis indumento denso argenteo e squamis appressis minute punctatis lepidotis vel sublepidotis multiradiatis 0.3-0.5 mm. diametro composito obsitis. *Ovula* dua per loculum. *Semen* pallide brunneum, 3.5-4 mm. longum, 3 mm. latum, ala angusta (0.05-)0.1-0.2 mm. lata. Fl. June, fr. July.

DISTRIBUTION AND HABITAT: Southeastern Anatolia and northern Syria and Iraq, on limestone and marl ledges, steppe hillsides, and scree; alt. 600-1650 m.

Turkey. B6: Prov. Malatya, Kalkmergelhügel östlich ob Darendé, 1000-1050 m., 28 June 1953, *Huber-Morath 11969* (HM; E); Mergelhügel, 2 km. westlich

ob Darende, an der Strasse nach Gürün, 1090 m., 28 June 1953, *Huber-Morath 11970* (HM); Mergelhügel nördlich ob dem Dorf Darende, 950–980 m., 20 June 1949, *Huber-Morath 9252* (HM); entre Derindeh et Kavak Aghatch (Akçadağ), 14 June 1906, *Post 52* (G). C9: Prov. Hâkâri, mons Bestabije (Beytüşşebap) prope Hoz, Amadia (Imfiya)-Sattak (Çatak), 1650 m., July 1910, *Nâbélek 1264* (BRA). Northern Syria. Desert nr. Marbat Antar, 3 May 1900, *Post s.n.* (BM). Northern Iraq. Kalk-Hänge bei Dorfruine Chara (Bir Garan) im Dschebel Abd'elasis (Debel-Abdul Aziz), 600 m., *Handel-Mazzetti s.n.* (W).

The closest ally to this new species in sect. *GAMOSEPALUM* is probably *Alyssum harputicum* Dudley. *Alyssum sulphureum* may be separated from it easily by the caespitose, dense cushion-forming habit, broader and shorter leaves, smaller lepidote scales with longer peripheral rays on the sterile shoot leaves and fruits, larger and usually bilobed petals, and the narrower membranous sepal margins. In addition, the stellate hairs on the upper cauline leaves, pedicels, and sepals often appear strigose with long, unequal and spreading rays. This form of indumentum is shared with *A. bornmuelleri* and *A. aizoides* in sect. *ALYSSUM*, from which *A. sulphureum* may be separated by the same characters which distinguish it from *A. harputicum*. The edentate long filaments and the presence of indumentum on the petals are also of differential value in separating the new species from *A. aizoides*.

Considerable difficulty was experienced in placing *Alyssum sulphureum* in the correct section due to its resemblance to some species of sect. *ALYSSUM*. The problem was clarified by observation on *A. sulphureum* of dimorphic sepals which, because of their interlocking indumentum, appear fused; copious indumentum on the inner surface of the sepals; and edentate, free but adjacent and overlapping, long filaments.

Hausknecht (1897) was bewildered by this resemblance of *Gamosepalum* to *Alyssum* and discussed it at length when he proposed the binomial *Gamosepalum alyssoides*. However, in any case, the specific epithet *alyssoides* may not be used for any taxon in *Alyssum* other than *A. alyssoides* (L.) L. (1759), a combination based on *Clypeola alyssoides* L. (1753). Hausknecht proposed that the name *Gamosepalum alyssoides* should be applied if, with the examination of additional material, it became evident that the three species he described (*G. lepidoto-stellatum*, *G. confine*, and *G. paphlagonicum*) did not warrant specific recognition. These three species would, according to him, then be reduced to the rank of varieties under *G. alyssoides*. It is interesting that the many additional collections of *Gamosepalum*, since the time of Hausknecht's descriptions, indicate that *G. lepidoto-stellatum* and *G. paphlagonicum* are distinct species and well differentiated from one another. *Gamosepalum confine*, however, as Schulz (1927) points out, must be treated as synonymous with *G. lepidoto-stellatum*.

***Alyssum harputicum* Dudley, sp. nov.** Holotype, Turkey, B7: Prov. Elâziğ, Armenia Turcica, Kharput (Harput) in summo monte Kisil

Depe, 10 May 1889, *Sintenis* 323 (G); isotypes (K, W) (all as *A. aizoides*). PL. IV, FIGS. 1-12.

A. aizoides sensu Baumg. Jahresb. Nied.-Öst. Land.-Lehrers. Wien.-Neust. 36: 24. 1909 et sensu Bornm. Symb. ad Fl. Anat. 54. 1936 — non Boiss.(!).

Affinis *A. lycaonico* (Schulz) Dudley sed squamis lepidotis duplo minoribus, caulibus longioribus ascendentibus, foliis surculorum steriliū angustioribus, sepalis haud inflatis minoribus, petalis minoribus indumento parciore differt.

Herba perennis e basi ramosa suffruticosa. *Planta* ex toto squamis appressis disciformibus albo-lepidotis punctatis 0.2-0.3 mm. latis dense vestita. *Caules floriferi* erecti vel arcuato-ascendentes, 5-11 cm. longi. *Surculi steriles* numerosi eoque caespitosi, fastigiati, ascendentes, 1-4 cm. longi, dense foliati. *Folia caulina* sessilia, acuta; inferiora obovato-oblan-ceolata, ca. 4 mm. longa, 1-1.5 mm. lata; mediana linearia vel lineari-cuneata, ca. 10 mm. longa, 0.5-1 mm. lata. *Folia surculorum steriliū* lineari-oblan-ceolata, 5-10 mm. longa, 0.5-1 mm. lata. *Corymbi* simplices vel pauci-ramosi, congesti, rotundati, 1.3-1.5(-2) cm. lati, foliis caulinis summis subinvolucrati. *Pedicelli* patentes vel erecti, ca. 5 mm. longi. *Sepala* persistentia, pseudoconnata, subcarinata, subinaequalia, apice cucullata, acuta, 2.5-4 mm. longa, 1-1.5 mm. lata, margine hyalina squamis tecta, in dimidio inferiore ob indumento intertexto cohaerentia, extus dense lepidota, intus pilis radiis valde inaequalibus duobus longis antrorse appressis et pilis stellatis radiis aequalibus brevibus vestita. *Petala* lutea, obovata vel spatulata, 5-5.5 mm. longa, 2 mm. lata, apice integra vel leviter retusa, unguis margine hyalina in parte superiore dilatata, 0.2-0.3 mm. lata, pilis stellatis paucis obsitus. *Filamenta longa* ca. 4 mm. longa, libera, sed verum contigua, edentata, bilateraliter membranaceo-marginata, superno sensim contracta. *Filamenta brevia* 3-3.5 mm. longa, basi appendice brevissima praedita. *Glandulae* prominentes, globosae. *Antherae* 0.8-1 mm. longae. *Ovarium* orbiculare, 2 mm. longum, 1.5 mm. latum, dense lepidoto-squamatum, apice emarginatum. *Ovula* dua per loculum, non marginata. *Stylus* in statu florescenti 2.5-3 mm. longus ad basin dense lepidotus stigmate globoso capitato provisus. *Fructus* ignotus. Fl. May.

The diagnostic characters separating *Alyssum harputicum* from *A. lycaonicum* are easily observed, and, although these species are widely separated geographically, they appear to be closely related. *Alyssum lycaonicum* has large and extremely inflated sepals enclosing the ovary or fruit (presumably of dispersal value), whereas *A. harputicum* has persistent but considerably smaller sepals which are never inflated. The petals and lepidote scales of both species are similar in form, but those of *A. harputicum* are always smaller. The narrow, almost needle-like, involute leaves of *A. harputicum* are unique in sect. GAMOSEPALUM. Similar leaves, however, are possessed by *Alyssum (Triplopetalum) pinifolium* (Nyár.) Dudley (sect. ODONTARRHENA), an example of parallel evolution in morphologically and taxonomically widely separated species.

Baumgartner (1909, p. 24) erroneously thought the type collection of *Alyssum harputicum* represented *A. aizoides* Boiss. in sect. ALYSSUM. Unfortunately he did not examine any material in addition to *Sintenis 323* and did not know *A. aizoides* sensu stricto, but relied on a Stapf determination. Bornmüller (1936) repeated this error but stated "folia linearia," accordingly including *A. harputicum* within *A. aizoides*. *Alyssum harputicum* is so distinct morphologically that it should never be confused with any other species, even its closest ally.

Alyssum niveum Dudley, sp. nov. Holotype, Turkey, B3: Prov. Eskişehir, distr. Sivrihisar, nordöstlich von Yaka Pinar, Steppe auf Kalk, 18 May 1941, *Romieux s.n.* (HM). PL. III, FIGS. 12–20.

Affinis *A. harputico* Dudley sed habitu valde diverso, foliis latioribus, petalis longioribus et squamis lepidotis maioribus differt.

Herba perennis, caespitosa, conferta, 3 cm. alta, 5 cm. lata. *Planta* ex toto indumento manifeste albo-argenteo squamis lepidotis multiradiatis appressis disciformibus manifeste punctatis (0.1–)0.2–0.5(0.7) mm. diametro dense vestita. *Folia* imbricata, summam versus accrescentia, sessilia, acuta, squamis lepidotis 0.4–0.5 mm. diametro dense oblecta; superiora involucreta, linearia, oblanceolata vel spatulata, 10–15 mm. longa, 2–3 mm. lata; inferiora lanceolata vel obovata, 7–10 mm. longa, 2–2.5 mm. lata. *Corymbi* simplices, conferti, umbelliformes, 1–2 cm. lati et longi, floribus 8–15. *Pedicelli* in statu florescenti subhorizontales vel divergentes, interdum deflexi, 3–4 mm. longi, indumento denso squamis lepidotis 0.4–0.5 mm. diametro tecti. *Sepala* lanceolata vel elliptica, obtusa vel subacuta, basi subsaccato-angulata, leviter dimorpha, pseudoconnata sed facile separata, in dimidio inferiore ob indumento intertexto cohaerentia, persistentia, (3–)3.5–4.5 mm. longa, (1.5–)2.5–3 mm. lata, margine hyalina 0.2–0.3 mm. lata, extus indumento denso squamis lepidotis 0.2–0.3 mm. diametro provisa, intus pilis stellatis appressis multiradiatis sublepidotis parce vel copiose munita. *Petala* spatulata, retusa vel subretusa, rare integra, flava, 6.5–7 mm. longa, 3–3.5 mm. lata, in ungue sensim attenuata vel ad medium constricta margine unguis saepe denticulata, squamis lepidotis 0.1–0.2 mm. latis in ungue (rare in lamina) obsita. *Filamenta longa* libera sed verum contigua, interdum omnino conniventia, angustissime bilateraliter alta, ad basim leviter dilatata, edentata, 3.5–4 mm. longa. *Filamenta brevia* 2.5–3 mm. longa, ad basim leviter dilatata, basi appendice brevissimo provisa. *Glandulae* minutae, globosae, lobatae. *Antherae* 1 mm. longae, apice obtusae vel subacutae, connectivo prolongato 0.2–0.3 mm. longo. *Ovarium* orbiculato-ovatum, apice emarginatum, 1.5–2.5 mm. longum, 1–2 mm. latum, indumento denso albo squamis lepidotis 0.4–0.5 mm. diametro provisum. *Ovula* dua per loculum, ut videtur solum una vel dua maturantes. *Stylus* in statu florescenti 2–2.5(–3) mm. longus, rigidus, ad basim dilatatus, in dimidio inferiore (rare ex toto) squamis lepidotis densis provisus, stigmatibus magno globoso provisus. *Fructus* ignotus. Fl. May.

A detailed comparison of the species in sect. GAMOSEPALUM shows that *Alyssum niveum*, a very rare steppe species, is morphologically closest to *A. harputicum*. *Alyssum niveum* deviates from *A. harputicum* in its extremely reduced habit, wider leaves, and larger lepidote scales. The petals of *A. niveum* are also distinctive in being very large and usually retuse, and in frequently having denticulate wings on the claws. The petals of *A. harputicum* are smaller and have entire claw wings.

Unfortunately, the species is known only from the type collection of one plant, but the numerous morphological discontinuities which distinguish it from the other species in sect. GAMOSEPALUM indicate that specific rank is appropriate. It is hoped that future collectors will rediscover this beautiful species. I was not successful in finding it in an area near the type locality.

***Alyssum lycaonicum* (Schulz) Dudley, comb. nov.**

Gamosepalum lycaonicum Schulz, Notizbl. Bot. Gart. Mus. Berlin 10: 110. 1927 (!). Holotype, Turkey, B3: Prov. Konya, Wilajet Konia, Steppe bei Korasch (Koraşi) in Lykaonien, 1400 m., June 1906, *Siehe 274* (B, non vidi); isotype (BM).

DISTRIBUTION AND HABITAT: Rare Anatolian endemic, confined to the dry steppe near Konya; alt. 1400 m. Fl. June.

The morphological discontinuities which define the limits of this species are of such significance that there should be no confusion with any other. The homomorphic indumentum of very large disciform lepidote scales (up to 2 mm. in diameter), the extremely inflated and enveloping calyx, the erect and tall growth, and the noninvolucrate cauline leaves which decrease in size upwards are sufficient to distinguish the species clearly from *Alyssum harputicum* and *A. niveum*, its closest allies. The distribution of these three species is completely allopatric.

This "*Gamosepalum*" was described as having deep yellow petals, a character which invalidated the original generic criterion of white petals (Schulz, 1927). However, *Alyssum baumgartnerianum*, designated by me as the type species of series *Libera* in sect. GAMOSEPALUM, also has deep yellow petals.

Section **Odontarrhena** (Meyer) Koch, Synop. Fl. Germ. Helv. 59. 1836.

LECTOTYPE SPECIES: *Alyssum tortuosum* Waldst. & Kit. ex Willd. Linn. Sp. Pl. ed. 4. 3(1): 466. 1800. [Waldst. & Kit. Pl. Rar. Hung. 1: 94. t. 91. 1802.] Lectotype, Hungary. In arenosis sterilissimis Hungariae (PR, *Herb. Waldstein no. 502369*).

Subsection **Inflata**, subsect. nov. TYPE SPECIES: *Alyssum tortuosum* Waldst. & Kit. ex Willd.

Silicula dehiscentia, pedicello rigido suffulta, valvis fere inflatis (aequalibus vel inaequalibus) vel raro subcompressis non undulatis vel conspicue nervosis.

Alyssum discolor Dudley & Huber-Morath, sp. nov. Holotype, Turkey, *Huber-Morath 11755* (HM); isotype (E). PL. V, FIGS. 1-11.

Affinis *A. syriaco* Nyár. et *A. chondrogyno* Burtt, sed ab omnibus speciebus habitu altiore et magis diffuso, inflorescentia maiore ramis longioribus divergentibus provisa, foliis maioribus petiolatis longioribus, et fructibus late ellipticis vel obovatis coriaceis rugosis glabris basi longe attenuatis stipitatis differt; a priore appendice diversa filamentae longae recedit; a posteriore (cui probabiliter magis affinis) forma et amplitudine fructuum distinguitur.

Planta perennis, pulchra, erecta, suffruticosa, supra basin multiramosa, ramis tenuibus subflexuosis. *Caules floriferi* erecti, 25-40 cm. longi, parce foliati, basi flavescenti-rubri, pilis stellatis parcis multiradiatis brevibus inaequalibus tecti. *Surculi steriles* erecti, e basi lignosi caulium floriferorum ascendentes, basi efoliati, 5-10 cm. longi, supra medium foliati, indumento denso cano obtecti. *Folia* conspicue bicolorata; pagina superior atrovirens pilis stellatis punctatis minutis appressis multiradiatis sparsis vestita; pagina inferior indumento denso albo-cano e pilis stellatis 15-20 radiatis tenuibus delicatulis appressis punctatis 0.2-0.3(-0.4) mm. diametro composito vestita. *Folia caulium floriferorum* divergentes rare subhorizontales, superne sensim decrescentia; inferiora obovata, spatulata, obtusa (15-) 20-35 mm. longa, (4-)6-8 mm. lata, petiolis 5-10 mm. longis; superiora oblanceolata vel anguste obovata, breviter petiolata (7-)8-10(-15) mm. longa, 1-2 mm. lata; summa subbracteata, oblanceolata, acuta, 8-10(-15) mm. longa, 1-1.5 mm. lata. *Folia caulium sterilium* stricte divergentia interdum deflexa, obovata, spatulata, obtusa, 1-20 mm. longa, 3-5(-6) mm. lata, petiolis 4-8 mm. longis. *Corymbi* 7-15(-18) cm. alti et lati, e ramis multis divergentibus vel stricte ascendentibus 3-5(-8) cm. longis compositi; inflorescentiae ultimae subumbelliformes vel in statu fructifero elongatae. *Pedicelli* tenues saepe filiformes, divergentes, 4-6.5 mm. longi, pilis stellatis appressis punctatis minutis multiradiatis valde parce muniti. *Sepala* membranacea, manifeste nervosa, lanceolata vel anguste ovata, basi subsaccata, obtusa, 3 mm. longa, 1 mm. lata, indumento pilis stellatis paucissimis appressis vel subappressis punctatis minutis brevibus paucis vel multis ca. 0.2 mm. diametro radiis saepe ramosis. *Petala* obovata, clavata, integra vel emarginata vel subemarginata, 3.5-4 mm. longa, 1 mm. lata, glabra. *Filamenta longa* 3-4 mm. longa, haud alata, appendice unidentata 1-1.5 mm. longa, basi connata. *Filamenta brevia* 2-2.5(-3) mm. longa, appendice libera lineari-lanceolata acuta vel minute bi- vel tridentata 1.5-2 mm. longa. *Glandulae* inconspicuae, minutae. *Antherae* 0.8-1 mm. longae, auriculatae, apice acutae vel subobtusae. *Ovarium* 1-1.5 mm. longum, 0.5-0.7 mm. latum, oblongo-ellipticum, acutum, glabrum. *Ovulum* unum per loculum. *Stylus* erectus tenuis, 2-2.5 (-3) mm. longus, glaber, stigmate magno capitato 0.2-0.3 mm. diametro provisus. *Silicula* late elliptica vel obovata (rare orbiculata) (5.5-)6-6.5 mm. longa, (2.7-)3-4 mm. lata, stipitata, basi longissime attenuata, stipite (0.5-)1-1.5 mm. longo, valvis coriaceis aequaliter inflatis, glabris manifeste rugosis promi-

nenter nervosis. *Semen* immaturum ut videtur anguste alatum. Fl. Apr.–May, fr. May–June.

DISTRIBUTION AND HABITAT: Rare endemic of southwest Anatolia found on limestone and sandstone cliffs and scree (rarely serpentine); often associated with *Pinus brutia* and *Smilax*; alt. 0–300 m.

Turkey. C2: Prov. Muğla, Marmaris, 30 m., *Pinetum brutiae* on serpentine, 24 Mar. 1956, *Davis 25246* (E); Hisarönü, Marmaris-Datça, 80–100 m., saxatile on dry sandstone rocks, uncommon, 6 June 1962, *Dudley (D. 35410)* (E); Muğla-Marmaris, 5 km. from Marmaris on descent from high pass, 150–200 m., common saxatile, forming dense thick clumps on limestone cliffs and scree, 3 June 1962, *Dudley (D. 35391)* (E); hills on south side of Marmaris village, 100 m., common forming dense clumps under *Pinus brutia* and *Smilax*, 7 June 1962, *Dudley (D. 35458)* (E). C3: Prov. Antalya, Bucht von Adrasan am Südfuss des Tahtali dağ (as “Çalbalı dağ”) zwischen Çirali und Finike, Macchie auf Kalk, 0–300 m., 27 May 1950, *Huber-Morath 11755* (HM; E).

Alyssum discolor is in the complex of perennial species including *A. corsicum* Duby, *A. masmenaeum* Boiss., *A. syriacum* Nyár., *A. troodi* Boiss., and *A. chondrogynum* Burtt, all of which have glabrous or glaucous fruits (rarely papillose and never with an indumentum of stellate hairs) and broadly spathulate or obcuneate, often bicolorous, sterile shoot leaves.

The new species, *Alyssum discolor*, differs from its allies, *A. syriacum* and *A. chondrogynum*, in being a more spreading plant, larger in all parts, and with broadly elliptic or obovate, rugose, basally long-attenuate and stipitate fruits. Furthermore, *A. discolor* may be separated from *A. syriacum* by the long basally connate appendage of the long filaments; and from *A. chondrogynum*, to which it is probably most closely related, by the shape and size of its fruits which are lacking in papillae.

A recent gathering of *Alyssum discolor* (*Dudley; D. 35410*) has broadly elliptic fruits somewhat larger than the obovate ones of the type material (PL. V, FIGS. 1 & 2). In all other characters, however, this collection corresponds exactly with the type gathering of *Huber-Morath*. An additional gathering (*Dudley; D. 35458*), collected in close proximity, has fruits exactly matching those of the type specimen. These collections indicate that the shape and size of the fruits of this species are subject to marked variation.

This beautiful chamaephyte is endemic to only a few localities in southwestern Anatolia and exhibits a preference for calcareous situations and low altitudes. One gathering (*Davis 25246*) indicates “serpentine,” but it is notable that these specimens are poorly developed and somewhat depauperate compared to populations from calcareous substrates. Most of the plants examined in the field formed large, woody, and saxatile clumps on limestone cliffs near the sea or on calcareous rubble under *Pinus brutia*.

***Alyssum davisianum* Dudley, sp. nov.** Holotype, Turkey, *Davis 36799* (E); isotypes (A, HM). PL. I, FIGS. 14–22.

Affinis *A. sibirico* Willd. sed in omnibus partibus minor, fructibus glabris, foliis angustioribus, indumento foliorum pauciori dissimili differt.

Planta perennis, caespitosa, 4–10 cm. alta et lata, in sicco lutescens, e basi multiramosa aphylla, lignosa, rubra, cicatrice prominenti foliorum, ex toto indumento virescenti vel cinereo, e pilis stellatis appressis punctatis 4–6 radiatis radiis ramosis aequalibus 0.3–0.6 mm. diametro composito. *Caules floriferi* tenues, ascendentes vel erecti, 4–8 cm. longi, parce foliati, ad basin efoliati, pilis stellatis radiis \pm longis ramosis sparse vel dense tecti. *Surculi steriles* apici dense foliati, e basi lignoso caulium floriferorum ascendentes, basi efoliati, 1–2.5 cm. longi. *Folia caulium floriferorum* oblanceolata, obtusa vel subacuta, descrescentia summam versus, post anthesim decidua, involucrata, flavo-virescentia, 7–10 mm. longa, 1–2 mm. lata. *Folia surculorum sterilium* lineari-oblanceolata vel spatulata; inferiora superioribus longiore, 5–8 mm. longa, 1–1.5 mm. lata; superiora dense imbricata, 3–5 mm. longa, 0.5–1 mm. lata. *Corymbi* ramosi, parviflori, ca. 2–5 cm. longi et lati, ramulis stricto ascendentibus vel patentibus, corymbis secundariis subumbelliformibus. *Pedicelli* tenues, rigidi, divergentes vel horizontales, rare deflexi, inter se 1–2 mm. distantes, 3–4 mm. longi, pilis stellatis appressis vel subappressis parce vel copiose provisi. *Sepala* decidua, membranacea, ad apicem carinata, cucullata, ovata, obtusa, 1–1.5 mm. longa, 0.5–0.8 mm. lata, anguste hyalino-marginata, pilis stellatis sparsissimis provisa. *Petala* in sicco aurea, obovata, integra vel retusa, in unguem sensim attenuata, glabra vel solum in ungue pilis stellatis provisa, 2 mm. longa, 0.5–0.7 mm. lata. *Filamenta longa* ca. 1 mm. longa, recurva; appendix bidentata vel acuta, in dimidio inferiore ad filamentum connata, apice libera, 0.3–0.5 mm. longa. *Filamenta brevia* 0.5–1 mm. longa, recurva; appendix libera, lanceolata, filamentum subaequans, apice bidentata vel acuta, 0.2–0.3 mm. lata. *Glandulae* conspicuae, globosae. *Antherae* minutae, 0.3–0.6 mm. longae. *Ovarium* orbiculatum, emarginatum, 0.5–0.7 mm. longum et latum, glabrum sed minute papillosum, translucens, flavo-viride. *Stylus* glaber, tenuis, rigidus, 0.5–1 mm. longus, stigmate leviter dilatato provisus. *Silicula* ut videtur uniseminata, orbiculata, emarginata, 2–3 mm. longa et lata, valvis membranaceis prominenter nervosis glabris laevigatis valde inaequaliter inflatis. *Ovulum* unum per loculum. *Semen* immaturum non alatum. Fl. June–July.

Turkey. B2: Prov. Kütahya, Murat dağ, above Gediz, above Kesit Sögüt, 1900 m., rocky igneous slopes, flowers bright yellow, 5 July 1962, *Davis 36799* (A, E, HM); between Kesit Sögüt and Hamam, 1400 m., on metamorphic rocks, 5 July 1962, *Davis 36862* (A, E).

Alyssum davisianum does not appear to be closely allied to any known species in sect. ODONTARRHENA, although it resembles *A. sibiricum* Willd. in the orbicular and extremely asymmetrically inflated fruit which has an S-shaped configuration in cross section. It differs strongly from *A. sibiricum* and the closest allies of that species (*A. borzaeanum* Nyár. and *A. caliacrae* Nyár.), in the reduced cushion-forming habit, the prominent

lignose base with copious and raised leaf scars; the much shorter and fewer-fruited corymb; the smaller and always glabrous fruit; the smaller and linear leaves; the indumentum of few-rayed, minute and appressed stellate hairs; and the yellowish-green aspect of the plant. Furthermore, *A. davisianum*, as a restricted endemic, has a preference for igneous or metamorphic substrates, whereas *A. sibiricum* is an extremely widespread and polymorphic species usually found in calcareous situations.

This new species is named in honor of the collector, Dr. P. H. Davis, of the University Department of Botany, Edinburgh, Scotland, whose energy and careful attention as the author's supervisor has always been inspiring.

Alyssum huber-morathii Dudley, sp. nov. Holotype, Turkey, *Khan, Prance & Ratcliffe* 256 (E); isotype (K). PL. V, FIGS. 12-23.

Affinis *A. fallacino* Hausskn. (syn. *A. baldaccii* Vierh. ex Nyár.) et verosimiliter *A. murali* Waldst. & Kit. (sensu *A. chlorocarpum* Hausskn.) sed ab ambobus habitu valde suffruticoso, foliis caulium fertilium et sterilium manifeste conduplicatis et valde argenteis, fructibus minoribus ellipticis vel anguste obovatis indumento parciore differt; a priore corymbis ultimis umbelliformibus (haud elongatis), pedicellis brevioribus tenuioribus recedit; a posteriore stylo tenuiore, seminibus angustissime alatis (haud late alatis) divergit.

Planta perennis, valde suffruticosa, a basi multiramosa. *Caules floriferi* stricti-ascendentes, parce foliosi, 18-25(-35) cm. alti, a basi rubropurpurei indumento parce summam versus magis conspicuo. *Surculi steriles* dense foliati, erecto-ascendentes vel laxe patentes, 8-16 cm. longi. *Folia caulium floriferorum* lineari-oblongata, acuta vel subobtusata, conduplicata, recurva, virescentia, post anthesin decidua, 10-15(-20) mm. longa, 1.5-2 mm. lata. *Folia caulium sterilium* lineari-oblongata, acuta, manifeste conduplicato-sulcata, (4-)10-20(-25) mm. longa, 1-1.5(-2.5) mm. lata, indumento dense lepidoto e pilis albis argenteis minute punctatis 15-20(-30) radiatis multo ramosis 0.4-0.5 mm. diametro composito. *Corymbi* constricti umbelliformes, (2.5-)8-10 cm. longi et lati, ramulis stricte ascendentibus, floribus in sicco pallide flavis. *Pedicelli* in statu fructifero rigidi, divergentes, ascendentes, 2.5-4.5 mm. longi, indumento appresso eo fructuum similiter dense obtecti. *Sepala* 1-1.5 mm. longa, 0.5-0.6 mm. lata, membranacea, cucullata, anguste ovata, obtusa, margine angusta hyalina, pilis stellatis solum 1-7 munita. *Petala* 2-2.5 mm. longa, (0.5-)0.6-0.7 mm. lata, clavata vel obovata, integra vel emarginata, glabra vel raro lamina pilis stellatis munita. *Filamenta longa* 2-2.5 mm. longa, appendicibus 1-1.5-plo longiora; appendix bidentata vel ad apicem minute multidentata, in dimidio inferiore ad filamentum connata, parte libera 0.2-0.3 mm. longa. *Filamenta brevia* 1-1.5 mm. longa; appendix libera filamentum subaequans, apice acuta vel bidentata. *Glandulae* minutae, haud conspicuae. *Antherae* minutae, 0.4-0.5 mm. longae. *Ovarium* obovatum, 1-1.5 mm. longum, 0.5-0.8 mm. latum, sursum apicem

dense piliferorum. *Stylus* in statu florescenti tenuis, glaber, 1.2–1.6 mm. longus, stigmatate globoso provisus. *Silicula* uniseminata, elliptica vel anguste obovata, (2–)3–3.5(–4) mm. longa, 1.5–2 mm. lata, pallido-virescens, obtusa vel subacuta, valvis inaequaliter inflatis, indumento parce apicem versus magis conspicuo e pilis stellatis appressis minute punctatis 0.2–0.3(–0.4) mm. diametro 4–8 radiatis multo ramosis composito obsitis. *Ovulum* unum per loculum. *Semina* (0.5–)1–1.5(–2) mm. longa et lata, pallide brunnea, anguste alata, 0.05–0.1 mm. diametro. Fl. June, fr. July.

Turkey. C2: Prov. Denizli, Suleymanlar deresi between Acipayam and Abbas Köy, 18 July 1947, *Davis 13461* (BM, E, K); Prov. Burdur, Yeşilova-Denizli, 20 miles from Yeşilova, 900 m., *Quercus* scrub and neglected fields, common in one area, 1 June 1962, *Dudley (D. 35324 & 35325)* (A, E). C3: Prov. Antalya, Antalya-Finike, 1350 m., stony ground, flowers yellow, 26 July 1960, *Khan, Prance & Ratcliffe 256* (E, K); dist. Kemer, (Lycia) between Ovacik yayla on Teke Dağ and Boğut yayla near Çalbalı Dağ, dominant on metamorphic slopes, 13 July 1949, *Davis 15225* (A, BM, E, K).

The affinity of *Alyssum huber-morathii* with any species occurring in Turkey is difficult to assess. Considering all representatives of sect. ODONTARRHENA, this new species appears most closely allied to *A. fallacinum* Hausskn., a rare species found in Crete and Greek Thessaly. In its habit, *A. huber-morathii* resembles *A. chlorocarpum*, a minor variant of *A. murale* Waldst. & Kit. which occurs in the Pindus region of northern Greece.

The much woodier habit, the very silvery, linear and always conduplicate leaves, and the smaller, usually elliptic fruits with sparser indumentum distinguish *Alyssum huber-morathii* from *A. fallacinum* and *A. murale*. In addition, the new species may be differentiated from *A. fallacinum* by its umbellate fruiting branches and shorter, more fragile pedicels, and from *A. murale* by the slender and often curved styles and very narrow seed-wings. Some affinity is expressed with *Alyssum cypricum* Nyár. which also has conduplicate leaves and, frequently, similar fruits and indumentum. However, *A. cypricum* differs in its smaller spathulate-obovate leaves, usually larger emarginate or truncate fruits with a dense indumentum; larger petals, wingless seeds and a distinctly cushion-forming type of growth.

The populations of *Alyssum huber-morathii* are frequently quite large and show a preference for serpentine or metamorphic rubble, but are distributed over a relatively limited range in southwestern Anatolia.

It is a pleasure to name this distinct species in honor of Dr. A. Huber-Morath, of Basel, Switzerland, a friend and untiring worker on Anatolian Flora, who put his voluminous *Alyssum* collection at my disposal.

***Alyssum pateri* Nyár. subsp. *prostratum* (Nyár.) Dudley, comb. & stat. nov.**

A. prostratum Boiss. & Huet ex Nyár. Bul. Grăd. Bot. Cluj 18: 98. fig. 3, n. 5, fig. 5, n. 4, t. 4, f. 4. 1938 (!). Holotype, Turkey, B8: Prov. Erzurum,

Armenia, Circa Erzerum, Apr. [sic] June 1853 (Bayburt-Erzurum, Kochapinar, 1829–2134 m.) *Huet s.n.* (JE); isotypes (BM, G, GH, K, W).

A. divrikii Nyár. *op. cit.* 93. *fig. 3, n. 6, t. 6, f. 9.* 1938 (!). Holotype, Turkey, B7: Prov. Sivas, Divriki (Divriği), 1000 m., June 1893, *Bornmüller 3247* (JE, non vidi); isotype (G).

A. erzerumi Nyár. *op. cit.* 98 — pro syn. (!).

DISTRIBUTION AND HABITAT: Replacing the typical subspecies of central Turkey in the Armenian Highlands and found in disturbed areas, corn fields, gravelly plains, and south-facing igneous and calcareous slopes and screes; alt. 1350–2591 m. Fl. June–July.

This taxon was originally described as a species by Nyárády, but examination of the type material, its duplicates, and additional gatherings shows that it has a maximum of three differential characters which can separate it from *Alyssum pateri*. These are: the wings on the long filament almost as long as the filaments; prominently dentate, retuse petals; and styles with a sparse indumentum. Nyárády himself stated that *A. prostratum* was closely allied to his *A. pateri* subsp. *squarrosoramosum*, now regarded as a synonym of *A. pateri* subsp. *pateri*. Though subspecies *prostratum* replaces the typical subspecies in the Armenian Highlands, their distributions overlap in Turkish Kurdistan. A few intermediates occur in the eastern and southeastern range of the typical subspecies.

Nyárády allies *Alyssum divrikii* to the Iranian *A. lanigerum*; however, the type of indumentum and the flower and fruit morphology of *A. divrikii* indicate that it should be treated as synonymous with *A. pateri* subsp. *prostratum*.

***Alyssum condensatum* Boiss. & Hausskn. subsp. *flexibile* (Nyár.)
Dudley, stat. nov.**

A. flexible Nyár. *Bul. Grăd. Bot. Cluj* 7: 157. *pl. 18, t. 5, f. 122, t. 6, f. 21, t. 7, f. 21, t. 9, f. 33.* 1927(!). Holotype, Syria. Circa Zebdaine pr. Damascus, frequens inter saxa jugi, inter Bludam et Halbun, 1896 m., 17 June 1855, *Kotschy 147* (CL, non vidi); isotypes (BM, G, K, W).

A. alpestre L. [var.] *β. suffrutescens* Boiss. *Fl. Or.* 1: 268. 1867 — pro parte quoad plantam a Kotschy lectam (*No. 147*)(!).

A. surculosum Shott & Kotschy ex Nyár. *op. cit.* 150. *t. 7, f. 14, t. 9, f. 26*(!). Lectotype, Turkey, C5: Prov. Içel, Bulgar dagh, Gusguta valley (nr. Külek boğ.), 2508 m., 26 June 1853, *Kotschy 10* (W); isolectotypes (G, K).

A. venustum Nyár. var. *rosulatum* Nyár. f. *simplex* Nyár. *Anal. Acad. Rep. Pop. Rom. Sect. Științe Geol. Geog. Biol. ser. A. mem. 3. 1:* 61. 1949(!). Lectotype, Turkey, C5: Prov. Adana, Farasch-Bereketli (nr. Pozanti), 3000 m., July 1909, *Siehe 309* (JE); isolectotypes (BM, E).

A. condensatum var. *typicum* Nyár. *op. cit.* 72. *t. 2, f. 3* (!). Holotype, Turkey, B6: Prov. Maraş, Berit dağ, 2338–2743 m., Aug. 1865, *Haussknecht s.n.* (JE); isotype (W).

A. condensatum var. *flexibile* (Nyár.) Nyár. *op. cit.* 73 (!).

DISTRIBUTION AND HABITAT: In Anatolia from the Cilician Taurus, Anti-Taurus and rarely in Turkish Kurdistan. Also known from Syria

and Lebanon. A montane and alpine taxon on limestone scree and slopes; often in *Pinus nigra* woods, and mixed *Abies* and *Cedrus* forests; alt. (1400–)2000–3000(–3500) m. Fl. June–July.

The holotype of subsp. *flexibile* (given full specific rank in 1927 and varietal status under *Alyssum condensatum* in 1949 by Nyárády) was referred by Boissier to his polymorphic and indefinable taxon *A. alpestre* L. [var.] *β. suffrutescens*.

The typical expression of subsp. *flexibile* is well distinguished from subsp. *condensatum*, with which it is partially sympatric; but intermediates occur in the area of overlap. The major features differentiating subsp. *flexibile* from the typical subspecies are the wider petals with an indumentum, and the fruits with usually attenuate apex and sparser and easily displaced indumentum.

Subsection **Compressa** Dudley, subsect. nov. TYPE SPECIES: *Alyssum murale* Waldst. & Kit. Pl. Rar. Hung. 1: 5. t. 6. 1799 (!).

A subsect. *Inflatis* siliculis compressis vel subinflatis ± undulatis semper conspicue nervosis differt.

Series **Integra** Dudley, ser. nov. TYPE SPECIES: *Alyssum murale* Waldst. & Kit.

Silicula marginibus apteris integris pedicellis rigidis patulis suffulta.

Alyssum murale Waldst. & Kit. Pl. Rar. Hung. 1: 5. t. 6. 1799. Lectotype, Romania. In muris vetustae arcis Devae in Transylvania atque in rupibus apricis vicini Banatus (PR, *Herb. Waldstein N. 495746a*). (Authentic specimens originally from the Waldstein herbarium are present in the herbaria of BM and GH.)

Due to the extreme polymorphism of *Alyssum murale*, approximately 40 specific and infraspecific epithets have been proposed for minor variations within the taxon which is now designated as subsp. *murale*. The full synonymy of *A. murale* will be published later. When considered throughout the whole morphological distribution pattern, *A. murale* seems to represent one highly variable and actively evolving genetic unit. Within this species, however, there are six reference points of variation which are morphologically and geographically correlated, and merit taxonomic distinction. The following synopsis cites the diagnostic characters and distribution of the recognized infraspecific taxa:

1. Subsp. *murale*: fertile stems few, ascending or lax; stellate hairs on fruits ± dense, 0.2–0.5(–1) mm. diameter; appendages of short filaments always free; seed wings 0.2–1 mm. wide. Widespread in central and southern Europe, the Levant, and extending as far east as Iraq, Caucasia, and Transcaspia.
 - a) Var. *murale*: vegetative indumentum bicolorous with equal and ± short-rayed, appressed stellate hairs, 0.2–0.5 mm. diameter; seed wings 0.4–1

mm. wide; leaves flat, midvein on upper surface not conspicuously depressed, uppermost cauline leaves not bracteate or involucrate. Distribution as for subsp. *murale*.

- b) Var. *alpinum* Boiss. ex Nyár.: vegetative indumentum and leaves as in var. *murale*; seed wings 0.2–0.3 mm. wide; uppermost cauline leaves bracteate and involucrate. Predominantly Anatolian from the Cilician Taurus to Lazistan and extending into central Caucasus.
- c) Var. *pichleri* (Velen.) Dudley: vegetative indumentum bicolorous with stellate hairs 1–1.5 mm. diameter of coarse, long, strigose and unequal rays; seed wings and leaves as in var. *murale*. Forming local populations in Bulgaria, Romania, northern Greece and Yugoslavia.
- d) Var. *haradjianii* (Rech. f.) Dudley: vegetative indumentum concolorous with appressed equal-rayed stellate hairs, 0.2–0.5 mm. diameter; seed wings as in var. *murale*; leaves frequently conduplicate, midvein on upper surface conspicuously depressed, uppermost cauline leaves not bracteate or involucrate. The Amanus in southern Anatolia, Syria and Lebanon.
2. Subsp. *stojanoffii* (Nyár.) Dudley: fertile stems many, decumbent or deflexed; stellate hairs on fruits sparse 0.2 mm. diameter; appendages of short filaments always adnate to filament; seed wings ca. 0.2 mm. in diameter or less. Rare on the Greek island of Samothrace and in the southern Rhodope Mountains of Bulgaria.

Var. *pichleri* (Velen.) Dudley, stat. nov.

A. pichleri Velen. Fl. Bulg. 38. 1891 (!). Holotype, Bulgaria. In collibus ad Philippoplin (Plovdiv), 1890, *Pichler s.n.* (PRC).

DISTRIBUTION AND HABITAT: Rare on calcareous and siliceous substrates in Yugoslavia, northern Greece, Bulgaria, Romania and (?) Turkey-in-Europe; alt. (120–)400–900 m. Fl. May–July. A number of specimens collected from the Dalmatian coast in Yugoslavia are intermediate between var. *pichleri* and var. *murale* in regard to the size and form of the stellate hairs.

Recognition of this taxon at specific, or even subspecific rank, cannot be recommended, because its larger stellate hairs (with unequal and divergent rays) is the only character (cf. Nyárády, 1927, p. 84) which will distinguish it from the typical expression of *Alyssum murale*. The stability of the configuration of its stellate hairs throughout the rather limited range of its distribution (excluding Yugoslavia) make it seem advisable to assign varietal status to *A. pichleri*, rather than to recognize it at any other rank.

Var. *haradjianii* (Rech. f.) Dudley, comb. & stat. nov.

A. haradjianii Rech. f. Ark. Bot. II. 5: 172. 1959 (!). Holotype, Turkey. D6: Prov. Hatay: Cassius (Akra dağ) 300–700 m., June 1909, *Haradjian 3021* (G); isotypes (E, K, W).

A. constellatum sensu Nyár. Anal. Acad. Rep. Pop. Rom. Sect. Științe Geol. Geog. Biol. ser. A. mem. 3. 1: 96. 1949 — non Boissier!

The characters of *Alyssum haradjianii* by which it may be separated from the typical variety of *A. murale* are not of an order indicating taxonomic distinctness beyond the rank of variety. The height of the fertile stems of the Haradjian gatherings, which caused Rechinger (1959) to interpret this taxon as intermediate between Nyárády's artificial categories "Humiliories" and "Elatiories," is not constant in the other specimens of the variety. The plants may be as tall or taller than many collections of var. *murale*. The small local populations of var. *haradjianii* are sympatric with var. *murale* in the Amanus of southern Turkey and in montane Syria and Lebanon. However, the concolorous and frequently conduplicate leaves, which always have conspicuously depressed mid-veins, of var. *haradjianii* permit it to be separated from var. *murale*.

Subsp. *stojanoffii* (Nyár.) Dudley, comb. nov.

- A. pichleri* subsp. *stojanoffii* Nyár. Repert. Sp. Nov. 27: 395. t. 103, f. 3. 1930. Holotype, Bulgaria. Macedonia bulgarica, in graminosis alpinis sub cacumine Kalabak, m. Belasica, alt. c. 2000 m., 20 July 1920, *Stojanoff s.n.* (SOM, non vidi).
- A. degenianum* Nyár. Bul. Gräd. Bot. Cluj 7: 87. t. 3, f. 45, 46. 1927 (!). Holotype, Greece. Samothrake, Monte Phenogari, 28 June 1890, *Degen s.n.* (w).
- A. degenianum* f. *subcaespitosum* Nyár. loc. cit.(!). Holotype, Greece. Samothrake, Monte Phenogari, 28 June 1890, *Degen s.n.* (w).

DISTRIBUTION AND HABITAT: Montane in grassy meadows on the Greek island of Samothrace and the southern Rhodope Mountains in Bulgaria; alt. (600–)1000–2000 m. Fl. June.

Although the type gathering of this subspecies has not been seen, its original description and accompanying photograph clearly establish it as the same taxon which Nyárády had previously regarded as *Alyssum degenianum*. Additional support for this conclusion is that specimens of *A. degenianum*, determined by Nyárády, have been collected from very near the type locality of subsp. *stojanoffii*. This close proximity and the correlation of the specimens with the literature establishes without much doubt that the two taxa are conspecific. It is evident that because *A. pichleri* differs from *A. murale* only by its very large (1–1.5 mm. in diameter) and coarse stellate hairs, it was necessary to reduce *A. pichleri* to varietal rank. Though subsp. *stojanoffii* was assigned originally to *A. pichleri*, the characters which distinguish it from all the other infraspecific taxa of *A. murale* are of a significance to merit subspecific recognition. Therefore, it would be unrealistic to reduce subsp. *stojanoffii* to the rank of form under var. *pichleri*. The specimens of *A. degenianum* cited by Nyárády (1949) from Lebanon, all refer to *A. murale* var. *haradjianii*.

Subsection **Samarifera** Dudley, subsect. nov. TYPE SPECIES: *Alyssum samariferum* Boiss. & Hausskn. in Boiss. Fl. Or. 1: 272. 1867. Holotype, Turkey, C6: Prov. Maraş, in monte Berytdagh Cataoniae

(Berit dağ), 1829–2338 m., 8 Aug. 1865, *Hausknecht s.n.* (G); isotypes (BM, K, W).

A subsect. *Inflatis* siliculis indehiscentibus samaroideis undulatis pendulis papyraceis semper compressis pedicello capillari flexuoso deflexo suffultis differt.

***Alyssum peltarioides* Boiss. subsp. *virgatiforme* (Nyár.) Dudley, stat. nov.**

A. peltarioides var. *virgatiforme* Nyár. Anal. Acad. Rep. Pop. Rom. Sect. Științe Geol. Geog. Biol. ser. A. mem. 3. 1: 84. 1949 (!). Lectotype, Turkey, B7: Prov. Erzincan, Sipikordagh, 28 July 1890, *Sintenis 3126* (JE); isolectotypes (BM, E, G, K, W).

DISTRIBUTION AND HABITAT: North and central Anatolia, Armenian Highlands, Anti-Taurus and Amanus; on north-facing igneous slopes; alt. 914–2600 m. Fl. June–July.

KEY TO SUBSPECIES

- Inflorescence condensed, sparingly branched, not more than 5 cm. long and with 5–15 fruits; stems congested or decumbent 5–10 cm. long. Subsp. *peltarioides*.
 Inflorescence widely spreading, strongly branched, 10–20 cm. long, and with 20–50 (or more) fruits; stems arcuate, ascending or erect, 25–50(–75) cm. long. Subsp. *virgatiforme*.

The characters distinguishing the infraspecific taxa of this species are constant over its whole range and are coupled with altitudinal and geographical preferences. The most westerly stations of the species are composed entirely of subsp. *virgatiforme*; however, in some localities in the eastern part of the range (Armenia), where the two subspecies are sympatric, they are confined to different altitudes and have different flowering times. The typical subspecies, which flowers later than subsp. *virgatiforme* and has a very reduced habit, is found near melting snow at altitudes from 2000 to 3580 meters. The consistency of their morphological expression in conjunction with the facts of geographical and altitudinal replacement indicates that for these taxa subspecific rank is more realistic than varietal rank.

***Alyssum caricum* Dudley & Huber-Morath, sp. nov.** Holotype, Turkey, *Huber-Morath 12824* (HM); isotypes (A, E). PL. II, FIGS. 1–11.

A. floribundum Boiss. & Bal. var. *latifolium* Nyár. Anal. Acad. Rep. Pop. Rom. Sect. Științe Geol. Geog. Biol. ser. A. mem. 3. 1: 82. 1949 (!). Lectotype, Turkey, *Huber-Morath 5566* (HM).

Affinis *A. peltarioidi* Boiss. et *A. trapeziformi* Bornm. ex Nyár., sed ab ambobus fructibus dissimilibus leviter obcordatis vel late obovatis, stylo longiore tenuiore, habitu magis ramoso, surculis sterilibus crassioribus

fere maioribus differt; insuper a priore fructu minus undulato obscure nervoso et ramulis corymbis longis rigidis ascendentibus minus laxis recedit; a posteriore forma pilorum stellatorum dissimili divergit.

Frutex perennis, supra basin multiramosa, basi lignosa efoliata 3–13 cm. alta. *Planta* ex toto (imprimis folia caulium sterilium) indumento albo-argenteo e pilis stellatis radiis (10–)15–25(–35) undulatis delicatulis longis vel brevibus saepe ramosis composito dense vestita. *Caules floriferi* erecti-ascendentes, e basi parce ramosi, parce foliati, 17–30(–37) cm. alti, basi rubro-purpurei, pilis stellatis appressis multiradiatis superne densioribus tecti. *Surculi steriles* erecti, e parte inferiore caulium floriferorum ascendentes, rare longiores caulibus floriferis (2.5–)5–13 cm. alti (subinde multiramosi et efoliati, ramis 25–30 cm. altis), dense foliati. *Folia caulium floriferorum* anguste oblanceolata vel oblongo-obovata, acuta vel obtusa, 10–15(–20) mm. longa, 1.5–2(–3) mm. lata, petiolis 3–5(–7) mm. longis, in apice bracteis inflorescentiae simulantibus, 7–10(–15) mm. longa, 1–2(–3) mm. lata. *Folia caulium sterilium* bene evoluta bicolora, obovato-oblanceolata, spatulata, basi cuneata, obtusa vel rare subacuta, (7–)10–20 mm. longa, (3–)5–7 mm. lata, petiolis 5–10 mm. longis; pagina superior indumento 3–4-plo minore eo paginae inferioris et radiis paucioribus brevioribus obtecta. *Corymbi* magni, multiramosi, 5–10(–15) cm. alti et lati, ramulis ultimis rigidis stricte ascendentibus 5–10(–15) mm. longis corymbis ultimis umbelliformibus fructibus 4–10(–15). *Pedicelli* fragillimi, tenues, flexuosi, deflexi, (3–)4–5(–5.5) mm. longi pilis stellatis appressis vel subappressis 10–15-radiatis pauca vel dense obsiti. *Sepala* lanceolata vel ovata, acuta, apice cucullata, 2–2.5 mm. longa, (0.5–)0.8–1 mm. lata, margine angusta hyalina et parcis vel copiosis pilis stellatis multiradiatis radiis \pm brevibus provisa. *Petala* obovata, spatulata, integra vel subretusa, 3–3.5 mm. longa 1–1.5 mm. lata, glabra vel rare in ungue pilis stellatis paucis provisa. *Filamenta longa* 2.5–3 mm. longa, ala unilaterali in dimidio inferiore connata, apice libero 1–2 dentato 0.3–0.5(–0.7) mm. longo. *Filamenta brevia* 2 mm. longa, appendice lata libera lanceolata vel oblanceolata acuta vel minute denticulata, (1–)1.5–2(–2.5) mm. longa, 0.4–0.5 mm. lata praedita. *Glandulae* minutae. *Ovarium* 1–1.5 mm. longum, 0.5–1 mm. latum, glabrum, transparens, infime obcordatum, retusum, subflavo-viride. *Stylus* glaber, tenuis, inaequaliter insertus, 1–1.5(–2) mm. longus. *Silicula* uni- vel duoseminata, brunneo-viridia, late obovata vel leviter obcordata, retuse vel rare truncata, basi breve attenuata (5–)6–7.5(–8) mm. longa, 4.5–6(–6.5) mm. lata, saepe pendula, margine parce papillosa imprimis apicem versus, valvis membranaceis glabris laevigatis haud undulatis ad medium subinflatis inconspicue nervosis. *Ovulum* unum per loculum. *Semina* oblonga, compressa, 2.5 mm. longa, 1.5 mm. lata, ala 0.1–0.2(–0.3) mm. lata. Fl. Apr.–June, fr. June–July.

HABITAT: Saxatile on serpentine outcrops, cliffs, ledges and scree; often in *Quercus* scrub and *Pinus brutia* or *P. nigra* woods; alt. (40–)100–900(–1219) m.

Turkey. C2: Prov. Muğla, Muğla-Fethiye, Kalkgeröll linkes Ufer des Namlam Çay, 42 km. südöstlich Muğla, 100 m., 20 June 1954, *Huber-Morath* 12824 (HM; A, E); 8 miles s. of Muğla, 590 m., forming dense compact clumps, common in roadside scree and serpentine outcrops, 29 May 1962, *Dudley* (D. 35132) (A, E); 25 miles from Muğla, roadside serpentine ledges and scree, 70 m., 29 May 1962, *Dudley* (D. 35137) (A, E); Muğla-Marmaris, *Poterium* Macchie, 45 km. südlich Muğla, 20 km. nördlich Marmaris, 40 m., 19 June 1954, *Huber-Morath* 12823 (E, HM); 20 km. from Marmaris, 60 m., very dry roadside, and serpentine outcrops, forming dense suffruticose, saxatile, spreading clumps, often leafless up to 2 ft., 5 June 1962, *Dudley* (D. 35390) (A, E); Kara böyürtleri Köyu, 30 April 1958, *Kayacik & Yaltirik s.n.* (E); Sandras dağ above Ağla on serpentine, 1219 m., 22 July 1947, *Davis* 13563 & 13621 (E); Muğla-Fethiye, rechtes Ufer des Namlam Çay, Macchie, 42 km. südöstlich Muğla, 7 June 1938, *Huber-Morath* 5149 (HM); *Pinetum* 116 km. südöstlich Muğla, 6 km. ob. Gölçük, 300 m., 7 June 1938, *Huber-Morath* 5566 (HM); Kale Tavas-Muğla, *Pinus brutia*-Wald, 47 km. nach Kale, 5 June 1938, *Huber-Morath* 5567 (HM); Muğla-Kale, 35 km. from Muğla, 900 m., serpentine outcrops in deep gorge, open *Pinus nigra* woods, 28 May 1962, *Dudley* (D. 35128) (A, E); 30 km. from Muğla, 850–870 m., steepest descent on road, serpentine outcrops and scree, dominant plant in shade of *Pinus brutia*-*Pinus nigra* overlap, 28 May 1962, *Dudley* (D. 35123) (A, E); 30 miles from Muğla, ca. 25 miles from Kale, 460 m., serpentine outcrops and scree, saxatile on cliffs and ledges, 9 June 1962, *Dudley* (D. 35531) (A, E).

Alyssum caricum shows the closest affinity with *A. peltarioides* and *A. trapeziforme* Bornm. ex Nyár., from which it is readily distinguished by its distinctive obcordate fruits, shorter styles, extremely woody and branched base (often leafless from the base for a foot or more) and the dense cushion of sterile shoots (often 3–4 feet across).

I have observed that *Alyssum caricum* grows with *A. corsicum* Duby in the lowland areas of Caria, in southwestern Anatolia but is restricted to serpentine outcrops and completely replaces *A. corsicum* in montane and alpine regions. Whereas *A. caricum* has a very restricted distribution of about 100 square miles, *A. corsicum* has a much wider range in western Anatolia and is primarily a plant of neglected fields and disturbed areas.

Nyárády (1949) erroneously described this plant as a variety of *Alyssum floribundum* (var. *latifolium*) to which *A. caricum* is not closely allied, and from which it differs in the shape and indumentum of the leaves and in the strikingly dissimilar fruits. Although a lectotype has been chosen from among the several syntypes of *Alyssum floribundum* var. *latifolium*, it certainly seems more satisfactory to describe this plant as a new species, rather than to apply a *nomen novum*. The description of *A. floribundum* var. *latifolium* is built into the structure of Nyárády's very long key and for this reason lacks the essential details which distinguish *A. caricum* from *A. floribundum* or any other species in subsect. SAMARIFERA. In any event, the epithet *latifolium* could not be applied at the specific level because of the earlier *A. latifolium* Vis., a synonym of *A. minus* (L.) Rothm.

***Alyssum pinifolium* (Nyár.) Dudley, comb. nov.**

Triplopetalum pinifolium Nyár. Magyar Bot. Lap. 24: 97. t. 1, f. 1-14. 1925 (!). Holotype, Turkey, A1 (A): Prov. Çanakkale, in monte Ulu Dagħ prope Renkoi (Erenköy) Anatoliae, 24 Apr. 1883, *Sintenis* 292 (LD, non vidi); isotypes (BM, E, G, K, UW, W).

DISTRIBUTION: An Anatolian endemic collected only twice from the Dardanelles.

The decision to treat this taxon, originally described as the type of a monotypic genus, *Triplopetalum* Nyár., as a species of *Alyssum* was difficult. Apart from the problem of assessing the value of the characters used to delimit *Triplopetalum* in a generic sense, the material extant in the numerous herbaria visited consisted only of duplicates of the type collection, all without fruits. Unfortunately, the only other collection (*Kirk*, E), made many years earlier, was also in the flowering state. It is established by overall resemblances and floral morphology, however, that *Triplopetalum* falls within a natural species complex containing all the taxa of sect. ODONTARRHENA with indehiscent fruits and brittle, deflexed or sigmoid pedicels.

The characters distinguishing *Alyssum pinifolium* from the other species of the complex are essentially those which characterized the genus *Triplopetalum*, i.e., the consistent presence of "sphaeroid crystals" appearing as pellucid dots on the sepals, petals, filaments, and ovary; the unusual needle-like, almost cylindrical leaves; and the petals with basal appendages (whence the name of the genus).

That *Alyssum lesbiacum* (Candargy) Rech. f. (1943) possesses consistently appendaged petals, as noted originally by Candargy ("petala . . . unguiculata basi bialata"), cannot be ignored when determining the fate of *Triplopetalum pinifolium*. Without doubt, the petal appendages of *A. lesbiacum* are homologous with those of *Triplopetalum*. The samaroid, indehiscent fruits on fragile sigmoid pedicels of *A. pinifolium* and *A. lesbiacum* clearly ally both to such species as *A. samariferum* Boiss. & Hausskn., *A. peltarioides*, *A. dubertretii* Gomb., etc. To consider *Triplopetalum* as a distinct genus would defeat the purposes of the natural grouping of species within sect. ODONTARRHENA and would cause it to be separated from those species with which it is very closely allied. Furthermore, it would be equally unwarranted to regard *A. lesbiacum* as a species of *Triplopetalum*, thereby also cleaving it from its closest allies.

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EXPLANATION OF PLATES

PLATE I

FIGS. 1–13. *Alyssum blepharocarpum*: 1, silicle (side view), $\times 6$; 2–5, silicles showing variability of indumentum (face view), $\times 6$; 6, seed, $\times 6$; 7, sepals, $\times 9$; 8, long filaments, $\times 9$; 9, short filaments, $\times 9$; 10, petal, $\times 9$; 11 & 12,

leaves of two different gatherings, $\times 2$; 13, stellate hairs from upper surface of a leaf, $\times 40$.

FIGS. 14-22. *A. davisianum*: 14, silicle (face view), $\times 6$; 15, silicle (side view), $\times 6$; 16, long filaments, $\times 9$; 17, short filaments, $\times 9$; 18, petal, $\times 9$; 19, sepal, $\times 9$; 20, cauline leaf, $\times 2$; 21, stellate hairs from upper surface of a cauline leaf, $\times 40$; 22, woody base of plant with a sterile shoot, $\times 1$.

PLATE II

FIGS. 1-11. *A. caricum*: 1, ultimate inflorescence, $\times 1$; 2, silicle (face view), $\times 6$; 3, silicle (side view), $\times 6$; 4, seed, $\times 6$; 5, long filaments, $\times 9$; 6, short filaments, $\times 9$; 7, petal, $\times 9$; 8, sepals, $\times 9$; leaf of sterile shoot, $\times 2$; 10, cauline leaf, $\times 2$; 11, stellate hair from upper surface of a cauline leaf, $\times 40$.

FIGS. 12-22. *A. trichocarpum*: 12, silicle (face view), $\times 6$; 13, silicle (side view), $\times 6$; 14, stellate hair from silicle, $\times 40$; 15, tuberculate hairs from silicles, $\times 12$; 16, seed, $\times 6$; 17, long filaments, $\times 9$; 18, short filaments, $\times 9$; 19, petal, $\times 9$; 20, sepal, $\times 9$; 21, leaf, $\times 2$; 22, stellate hairs from upper surface of a leaf, $\times 40$.

PLATE III

FIGS. 1-11. *Alyssum corningii*: 1, silicle (face view), $\times 6.5$; 2, silicle (side view), $\times 6.5$; 3, seed, $\times 6.5$; 4, short filament, $\times 6.5$; 5, long filament, $\times 6.5$; 6, petals, $\times 8$; 7, ventral view of outer sepal, $\times 8$; 8, dorsal view of inner sepal, $\times 8$; 9, stellate hair from upper surface of a cauline leaf, $\times 100$; 10, stellate hair from silicle, $\times 100$; 11, stellate hair from lower stem, $\times 100$.

FIGS. 12-20. *A. niveum*: 12, sepals, $\times 6.5$; 12a, detail of base of sepals showing interdigitating hairs, $\times 26$; 13, short filament, $\times 6.5$; 14, long filament, $\times 6.5$; 15, petal, $\times 8$; 16, young ovary, $\times 6.5$; 17, stigma, $\times 33$; 18, cauline leaf, $\times 4.5$; 19, lepidote hair from upper surface of cauline leaf, $\times 65$; 20, lepidote hair from dorsal surface of sepal, $\times 65$.

PLATE IV

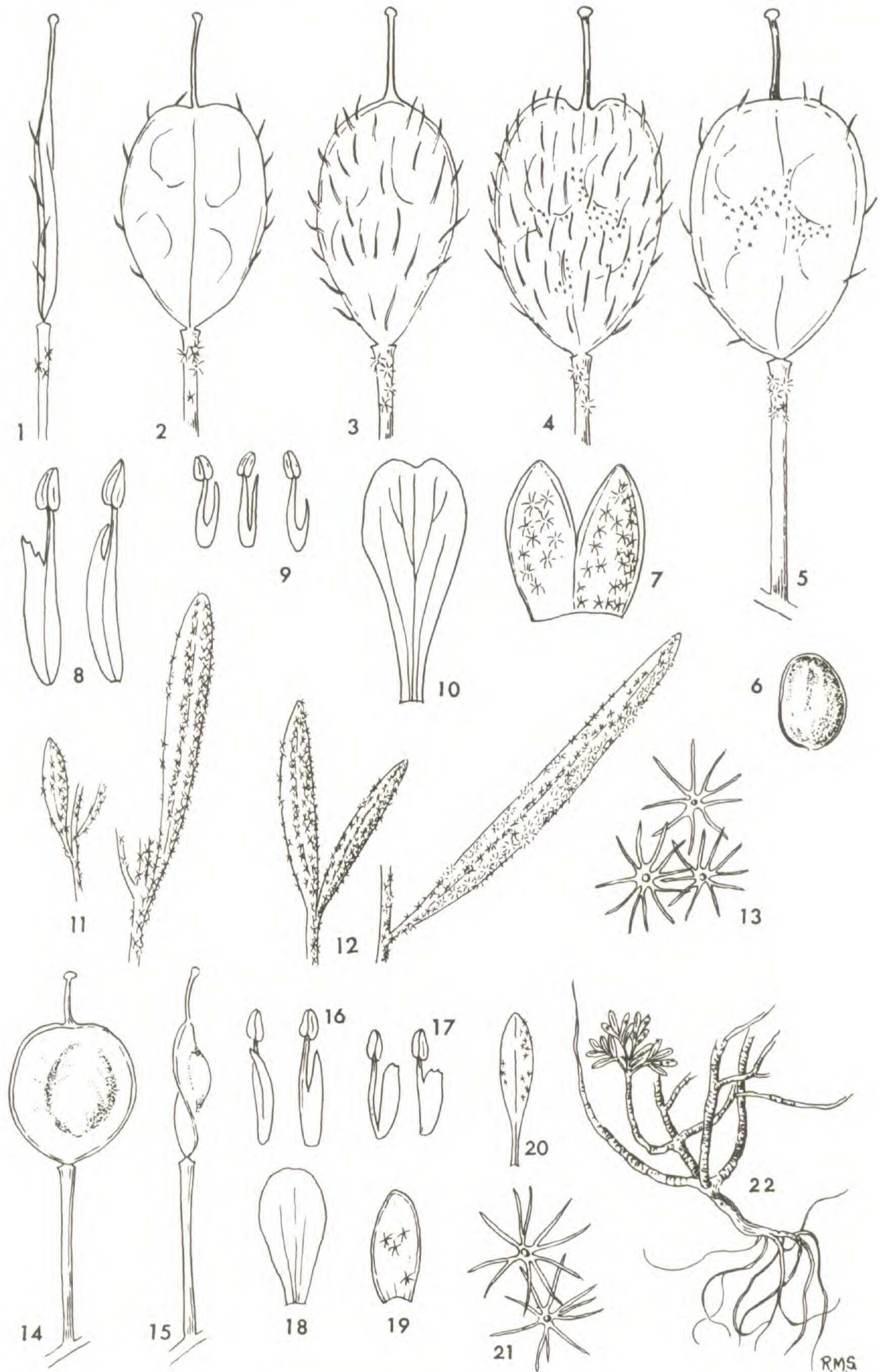
FIGS. 1-12. *Alyssum harputicum*: 1, silicle (immature), $\times 9$; 2, lepidote hair from silicle, $\times 40$; 3, short filament, $\times 9$; 4, long filaments, $\times 9$; 5, petal, $\times 9$; 6, sepals, $\times 9$; 7, ventral surface of a sepal with stellate hairs, $\times 9$; 8, stigma, $\times 16$; 9, sterile shoot, $\times 2$; 10, lower cauline leaves, $\times 2$; 11, upper cauline leaf, $\times 2$; 12, lepidote hair from upper surface of a lower cauline leaf, $\times 40$.

FIGS. 13-26. *A. sulphureum*: 13, ultimate inflorescence, $\times 1$; 14, silicle (face view), $\times 6$; 15, silicle (side view), $\times 6$; 16, stellate hair from silicle, $\times 40$; 17, short filaments, $\times 9$; 18, long filaments, $\times 9$; 19, petal, $\times 9$; 20, sepals, $\times 9$; 21, ventral surface of a sepal with stellate hairs, $\times 9$; 22, tuberculate and divergent rayed stellate hair from apex of a sepal, $\times 40$; 23, sublepidote stellate hair from exterior of a sepal, $\times 40$; 24, seed, $\times 6$; 25, sterile shoot, $\times 2$; 26, cauline leaf, $\times 2$.

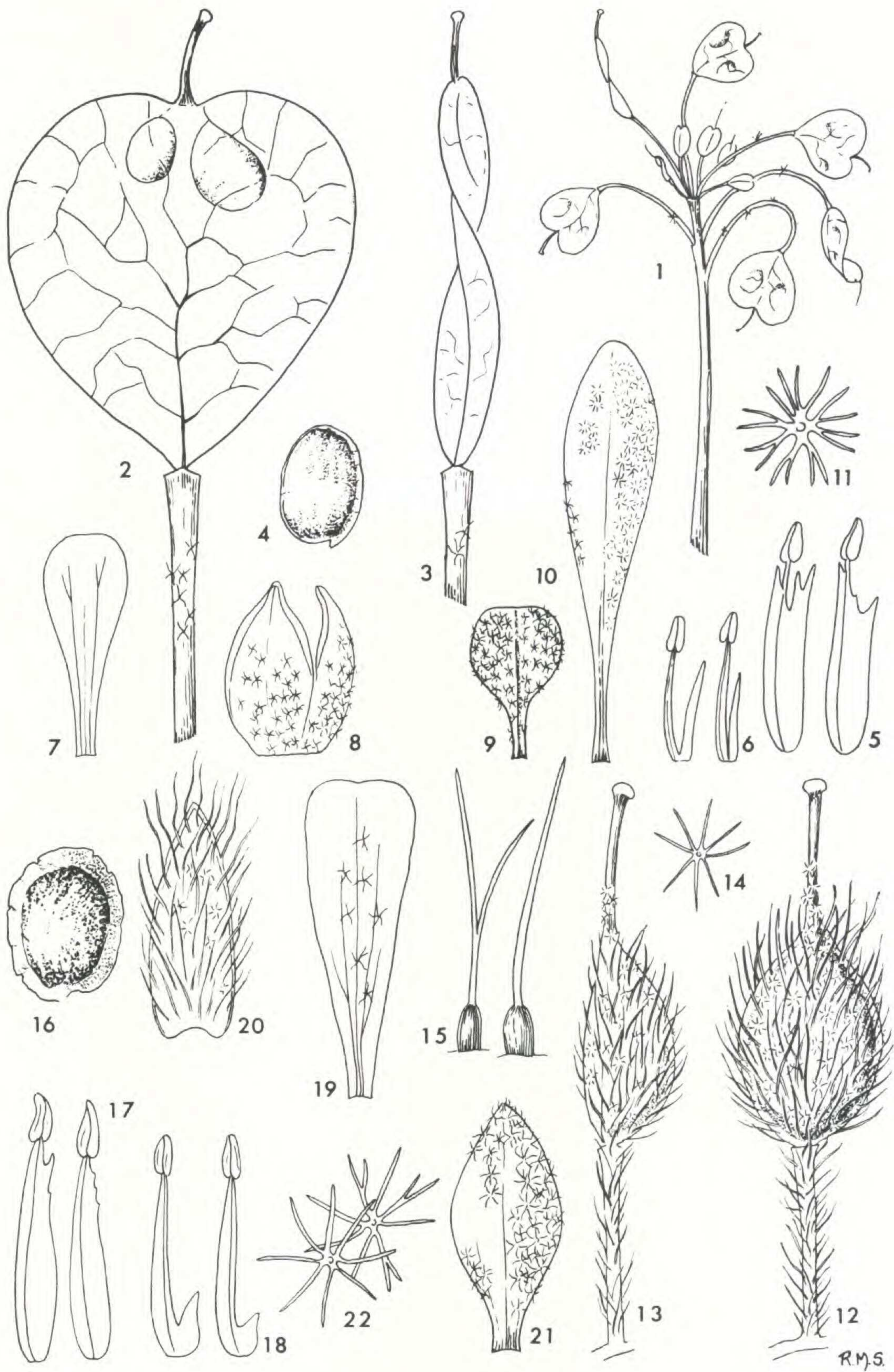
PLATE V

FIGS. 1-11. *Alyssum discolor*: 1 & 2, silicles (face views), $\times 7$; 3, silicle (side view), $\times 7$; 4, sepal, $\times 9$; 5, petals, $\times 9$; 6, long filament, $\times 8$; 7, short filaments, $\times 12$; 8, cauline leaf (lower surface), $\times 2$; 9, leaf of a sterile shoot (upper surface), $\times 3$; 10, stellate hair from upper surface of a cauline leaf, $\times 95$; 11, seed, $\times 26$.

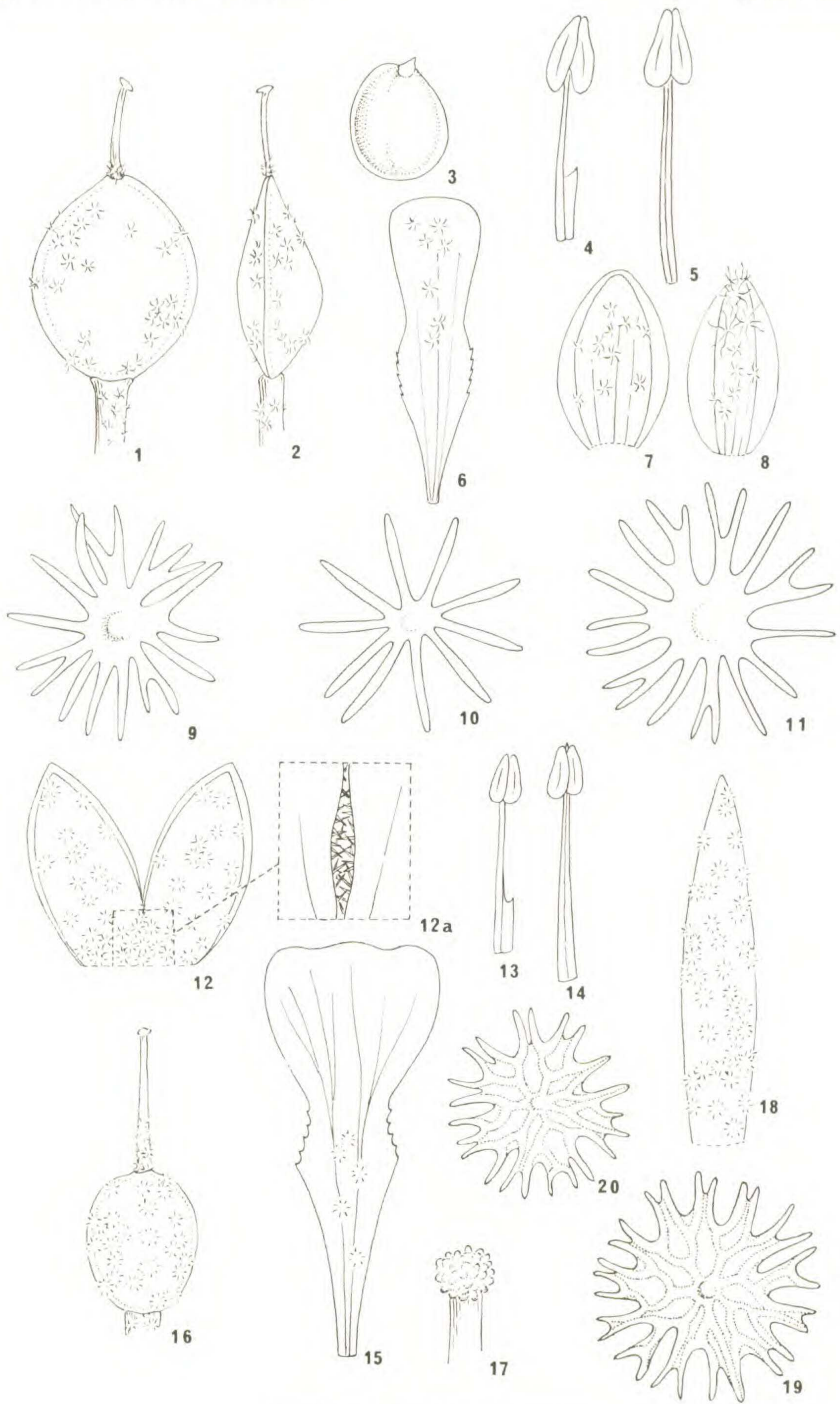
FIGS. 12-23. *A. huber-morathii*: 12, sepals, $\times 14$; 13, short filaments, $\times 16$; 14, long filaments, $\times 10$; 15, silicle (face view), $\times 9$; 16, silicle (side view), $\times 9$; 17, petals, $\times 10$; 18 & 18a, stellate hairs from silicle, $\times 40$; 19, largest leaf of a sterile shoot, $\times 2$; 20, medium leaf of a sterile shoot, $\times 2$; 21, smallest leaf of a sterile shoot, $\times 2$; 22, stellate hair from upper surface of a leaf of a sterile shoot, $\times 20$; 23, seed, $\times 26$.



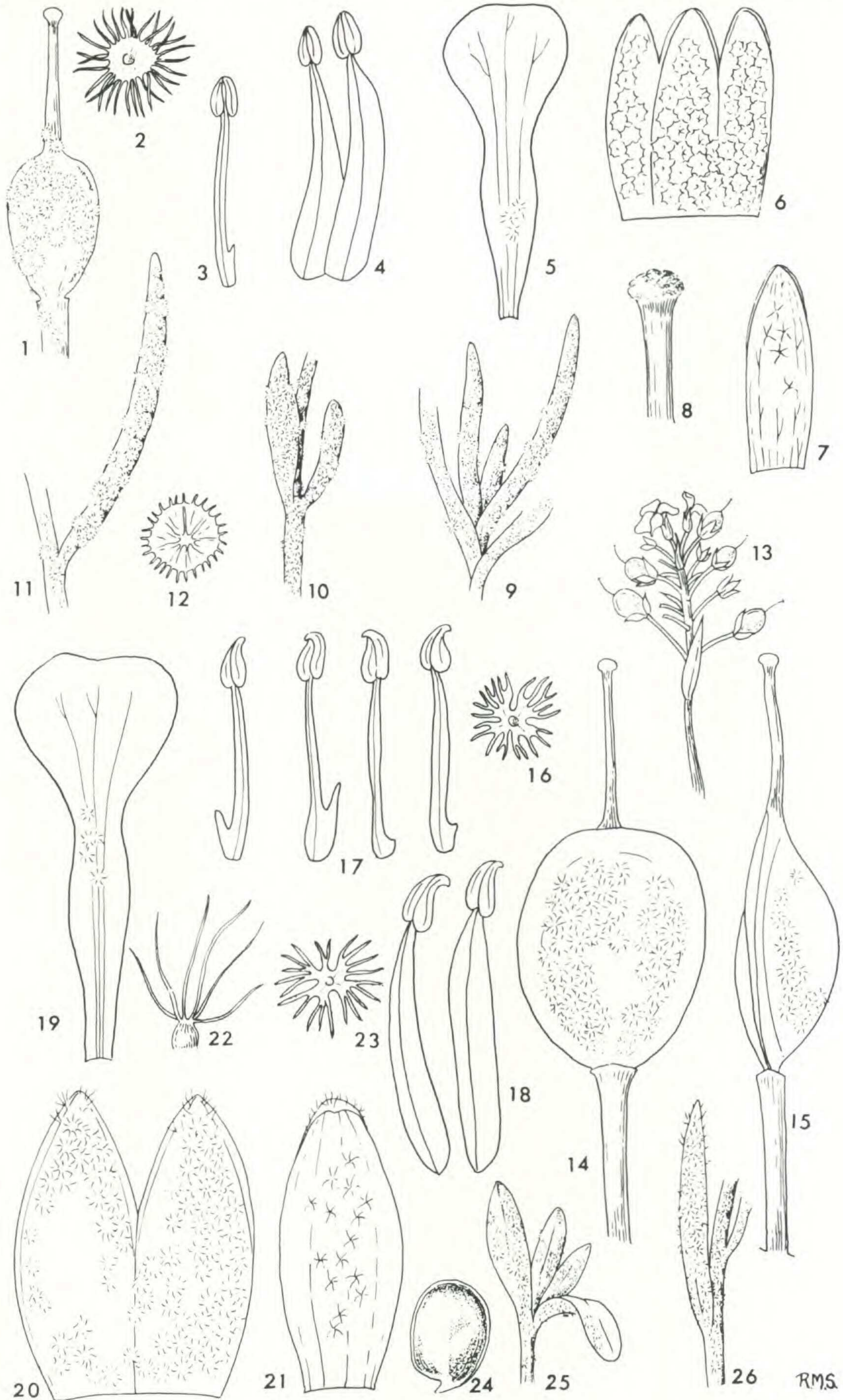
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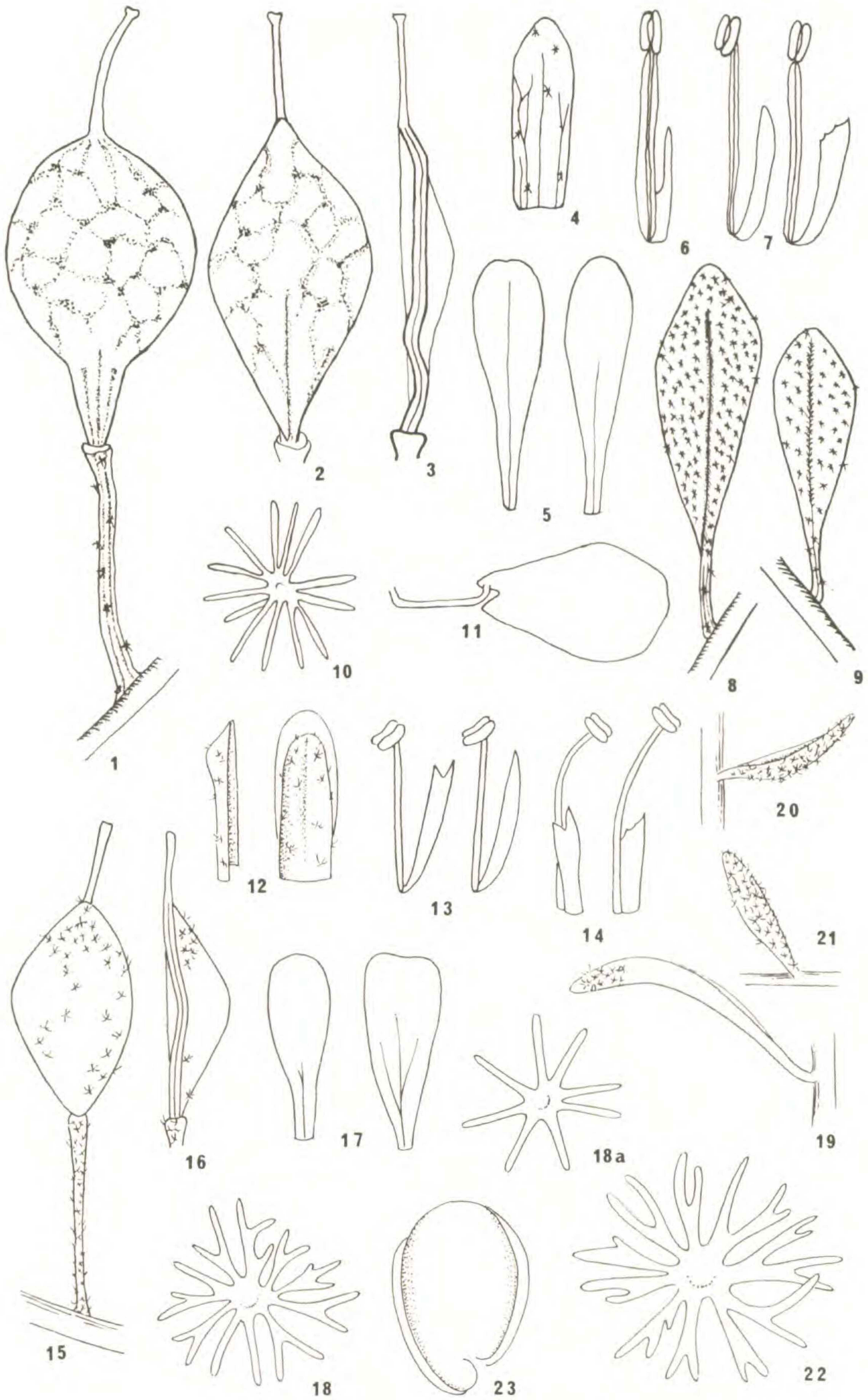


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